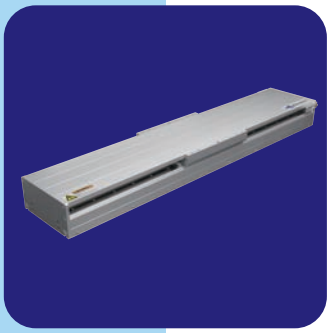
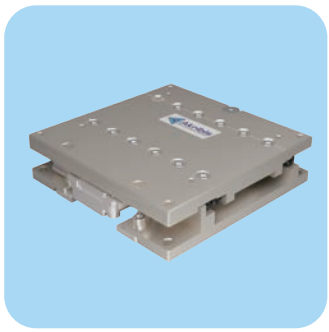
Akribis
where precision matters

Direct Drive Stages

Linear Motor Stages / Voice Coil Stages



where precision matters

EN-25.5.1

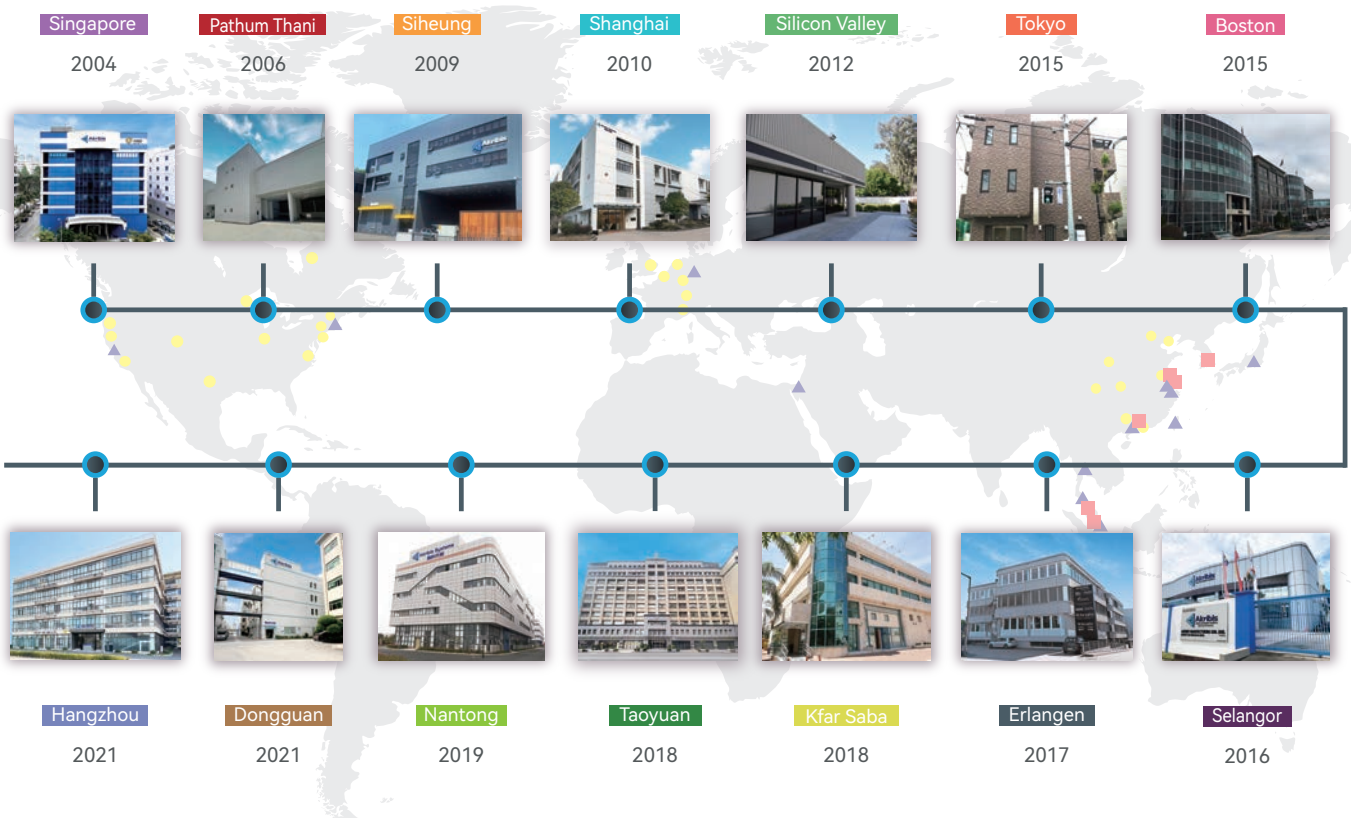
Akribis is a Latinized Greek word that means “Precision”. On the Akribis logo, the letter “a” is formed by a line and a circle, representing linear and rotary motions. These are supported by a tetrahedron structure, the same structure as the diamond crystal which has many exceptional physical properties.

The logo signifies that Akribis Systems’sound engineering expertise is the basis of the company’s foundation, and this enables us to provide customers with precise, direct drive motion control solutions.

Akribis Systems Pte Ltd was founded in 2004. We design and manufacture direct drive motors, stages and precision systems that are used in equipment for manufacturing, inspection and testing. Akribis Systems supports a wide range of industries including semiconductor, solar, flat panel, hard disk, LED, printed circuit board, printing, photonics and biomedical manufacturing.

From the beginning, the company has been focusing on innovation and development of new technologies and solutions in motion control, with more than 148 patents applied. Backed by a very strong and committed engineering team, the company continues to develop custom motors and systems for demanding applications.

We have manufacturing facilities in Singapore and in Shanghai, Nantong and Dongguan, China and in Selangor, Malaysia and in Siheung, Korea. Our sales network includes our sales offices in USA, Germany, South Korea, Japan, Thailand, Israel and Malaysia, and is reinforced by our comprehensive distribution channels in Asia, Europe and North America.



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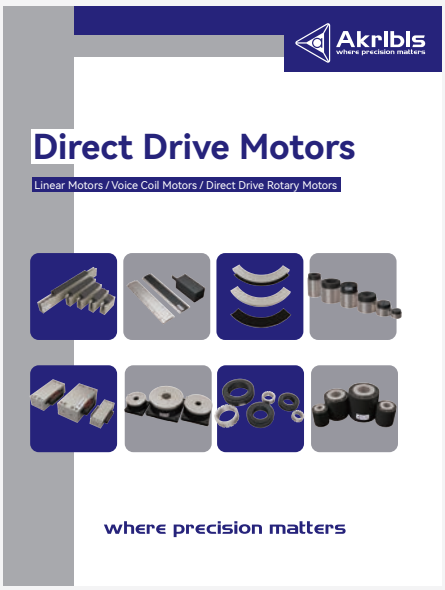


Please refer to **Direct Drive Motors** for Akribis direct drive motors.

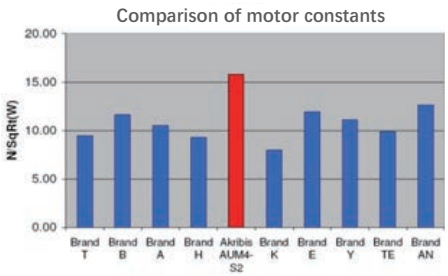
Introduction

Most Complete Range of Linear Motors

Akribis linear motors can be categorized into iron core and ironless series. Consisting of motor coils and magnet tracks, Akribis linear motors provide unparalleled advantages and features to improve system performance and efficiency: high speed, high acceleration, low velocity ripple, low operation noise, superior stability, wear & tear free, maintenance free, and long travel stroke. Akribis offers various models under each category, including: AUM, AWM, AHM, ALM-T, ACR and RDM series ironless linear motors; AJM, AQM, AKM and AKH series iron core linear motors for automation industry. AKM and AKH series iron core motor with water/oil cooling options for CNC industry.

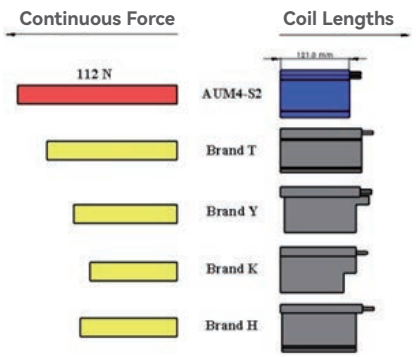
1. High motor constant

Our AUM series motors utilize our patented design to generate high amount of force possible while maintaining a compact form factor. In comparison to other motors in its class, AUM series motors exhibit high motor constant, which is a measure of efficiency of a motor and it also determines the continuous force a motor can produce.



2. Short coil lengths

Our AUM motors are capable of generating high force output even with shorter coil lengths.

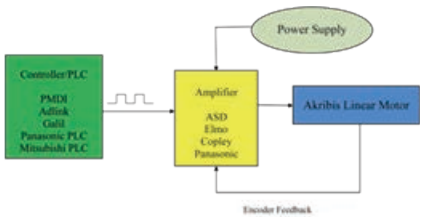


3. Custom design is possible

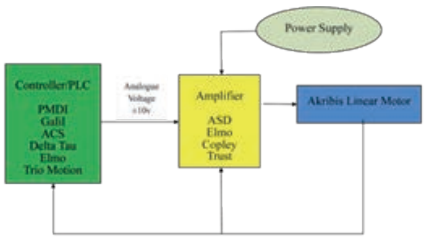
For applications where none of our standard linear motors fit your requirements. Akribis can offer customized designs. We design custom motors for disk drive, semiconductor front and back end, PCB and other industries. From concept design, prototyping and production, Akribis
engineers have vast experience in helping our customers achieve the performance they need at affordable costs.

4. Flexible control modes

Akribis linear motors are compatible with all well-known motion controllers and drivers.



1. Pulse and direction operating mode
2. Analog current / velocity operating mode
3. Distributed control (EtherCAT, CANopen, RS232, PROFINET)



Voice Coil Motors

Voice coil motors are short stroke actuators that utilize the electromagnetic interaction between permanent magnets and coil windings to generate thrust output. It is a direct drive motor, meaning it drives the load directly without requiring any transmission mechanism.

Akribis offers various types of voice coil motors, including AVM series cylindrical motors and AVA series planar motors.

1. Types of motion control for voice coil motors

1.1 Two postion control

A voice coil motor can be used as a simple two position actuator. Mounted with linear guidance bearings, the coil is typically moved while the core is kept stationary, although the reverse can also be done. A positive current causes the voice coil motor to move in one direction, while a negative current causes it to move in the opposite direction. At both ends, hard stops can be used to stop the motion, very much like a pneumatic actuator, except that a voice coil motor is completely powered by electricity without the need for compressed air.

A two position electronic drive, EOD from Akribis can be used to drive the voice coil motor in the manner described above. The peak current, peak current duration and holding current can be adjusted to control the start of motion and the holding force of the voice coil motor at stationary position.

1.2 Servo control

A voice coil motor can also be used as a servo motor. Other than linear bearings, a feedback device such as a linear encoder can be used for closed loop control. In this way, the acceleration, velocity and stopping position of the voice coil motor can be controlled precisely.
For example, the XMGV is a complete servo controlled voice coil module consisting of AVM voice coil motor, linear bearings and a linear encoder.

2. Advantages of using voice coil actuators

1. Low moving mass inertia
The moving coil typically has low mass inertia, enabling very high acceleration and short settling time with direct drive input.

2. Low inductance
The inductance of a voice coil motor is typically very low. Hence, the electrical time constant is very low, enabling the voice coil motor to have very fast response.

3. Smooth motion
There is no detent force in a voice coil motor. Hence, very smooth motion can be achieved, even at low speed.

4. Reliability
Since there is no contact between the coil and the core of a voice coil motor, there is no wear and tear, making the voice coil motor very reliable.

5. Force control
The force produced by a voice coil motor is linearly proportional to the current applied. This makes it suitable for force control applications.

Direct Drive Rotary Motors

Direct drive rotary motors (DDR) are motors that are designed to drive loads directly without the need of any transmission mechanism, such as gears or belts. These motors are also called torque motors. They use high energy permanent magnets to generate high torque.

Akribis offers various types of DDRs, including ADR-A series, ADR-B series, ADR-P series, ADR-F series, ADR-T series, ACD series, ACW series and AXD series. We also design many customized direct drive motors according to specific applications.

1. ADR-A series

The ADR-A series motors are iron core type of brushless motors. Through our unique winding design, our ADR-A series motors produce very high torque, compared to other motors in the industry. The form factor of our ADR-A series motors is also smaller than competitor products. With low rotor inertia, these motors give better response and settling time. The maximum speed for our motors is also relatively higher than other motors.

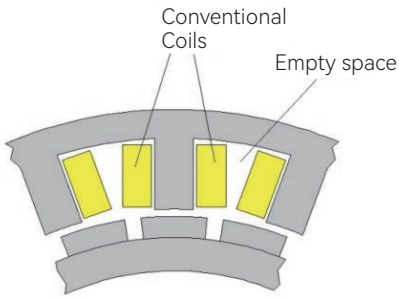
The figure on the right show the windings of a conventional DDR and our ADR-A series.

For a conventional DDR, the coils are wound and inserted into the slots, between the teeth of the stator. The coils are rectangular in shape when viewed from the top. Therefore, there is an large empty space in between the the coils. This space is wasted, since the available magnetic flux is not used to produce any torque in this region.

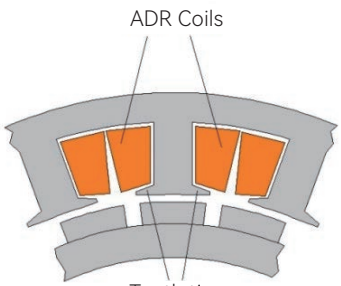
For the ADR-A series, the coils are wound with a special technique, and up to 35% more coils can be wound, fully utilizing the space in the slots. This results in much higher torque compared to the motor with the same form factor.

The ADR-A series also has tooth tips on the stator teeth. This design minimizes the cogging torque significantly, without compromising the motor performance. Akribis design engineers put in a lot of effort to optimize the performance of the motors, including reducing the cogging torque to a minimum level.

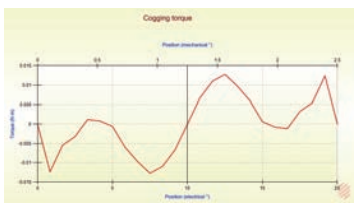
On the right is an example that shows the cogging torque of a motor at different positions.



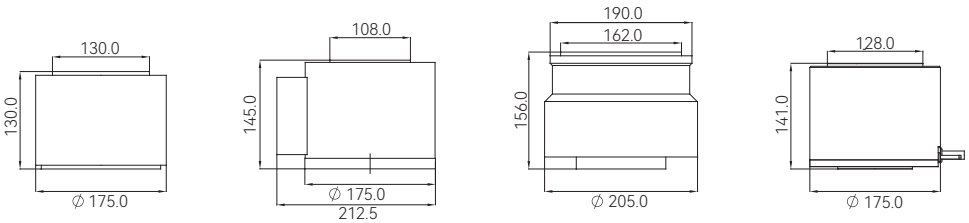
Conventional DDR



ADR-A Series



Below is an illustration that compares our ADR175-A-138, to other motors with similar diameter.



Brand/Models	Unit	Brand 1	Brand 2	Brand 3	Akribis ADR175-A-138	Our Advantages
Outer Diameter	mm	175.0	175.2	190.0 (205.0)	175.0	Low Height
Motor Height	mm	130.0	145.0	156.0	141.0	Low Height
Peak Torque	Nm	42.0	32.8	30.0	98.6	Higher Peak Torque
Continuous Torque	Nm	14.0	9.8	Not published	32.9	Higher Continuous Torque
Max Speed (230VAC)	rpm	300	498	120	470	Higher Speed
Rotor Inertia	Kgm^2	0.022	0.0071	0.072	0.0076	Low Rotor Inertia

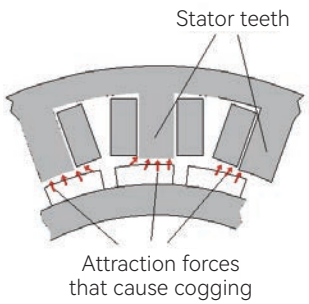
The ADR-A series motors are designed with low cogging torque. They are fully integrated with bearings and different options of encoders, such as optical encoder with digital output, and optical encoder with SINCOS. The motors also come with low and high speed windings (S or P).

2. ADR-P, ADR-F, ADR-T and ACD-P series

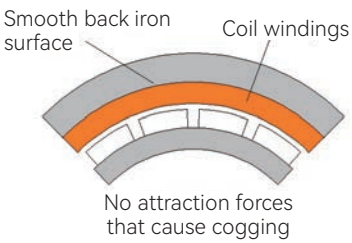
Akribis frameless torque motor ADR-P, ADR-F, ADR-T and ACD-P series consist of only rotors and stators, allowing them to be easily integrated into complex systems. ADR-P series motors are equipped with hall sensors, which easily interface with all types of servo amplifiers and controllers. ADR-F and ADR-T series motors are specifically designed for robot joint applications with low voltage and high speed requirements. The unique coil winding design yields one of the highest torque density in the market. Moreover, ADR-T series are more compact and more cost-effective.

3. ACD series

The ACD series motors are coreless type of brushless motors. These motors do not produce any cogging torque. Consequently, smooth motion can be achieved with low velocity ripple. The unique winding design also gives high torque density, although the output torque is lower than the ADR-A series motors.



Conventional iron core DDR



ACD Series

These motors are also integrated with high precision bearings, which give good radial and axial runout. High resolution optical encoders with digital output and SINCOS are available as options. The motors also come with low and high speed winding connections (D or Y).

4. ACW series

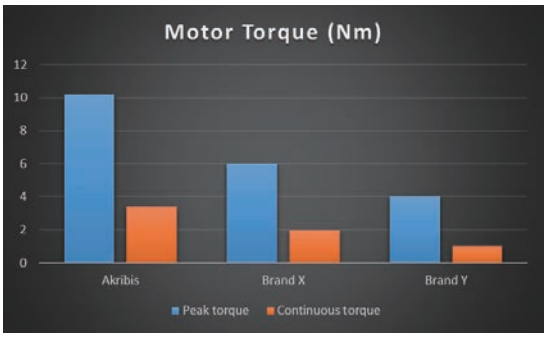
The ACW series are using coreless technology. They are designed with very low profile, and the motors do not produce any cogging torque, which allows smooth motion to be achieved with low velocity ripple.

5. AXD series

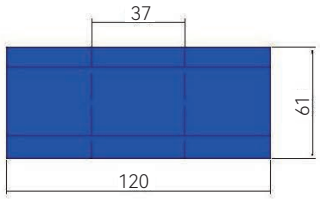
The AXD series are ironcore brushless DC motor. Being similar to ACW series, AXD series adopt flat design, featuring with large centre hole, small volume, high torque density, low moment of inertia and light in mass and combine with high resolution optical encoder with high precision.

Compact size with high torque density

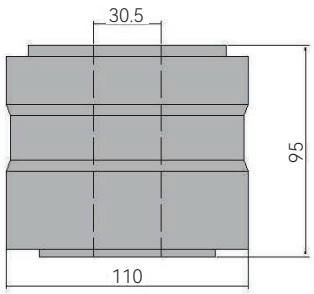
The AXD series direct drive torque motor has very high torque density. The peak torque and continuous torque are high, even though the motor form factor is relatively small. On the right is a graph that shows the comparison with 2 competitors' motors with similar size.



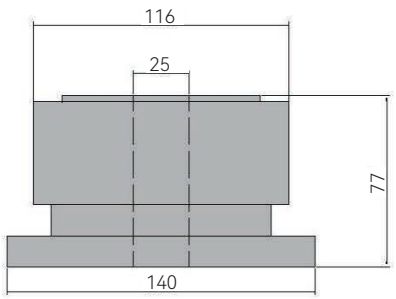
The table below compares the key specifications of AXD motor with 2 competitors' motors of similar size. AXD motors outperform their competitors in all aspects.



Akribis AXD



Brand X



Brand Y

Brand/Models	Akribis AXD 120	Brand X AX200XX	Brand Y DM1C-XXX	AXD vs Competitor
Motor height	61 mm	95 mm	77 mm	AXD is 26%~56% better
Peak torque	10.0 Nm	6 Nm	4 Nm	AXD is 70%~155% better
Continuous torque	3.4 Nm	2 Nm	1 Nm	AXD is 70%~240% better
Centre hole size	37 mm	30.5 mm	25 mm	AXD is 21%~48% better
Max speed	1400 rpm	300 rpm	150 rpm	AXD is 360%~830% better
Rotor inertia	0.00102 kg·m²	0.00575 kg·m²	0.0025 kg·m²	AXD is 145%~464% better
Motor mass	2.7 Kg	4.7 kg	3 Kg	AXD is 11%~74% better
Repeatability	± 3 arcsec	± 5 arcsec	±3 arcsec	AXD is 66% better

Low rotor inertia

In the torque equation T = Jα (where T is torque, J is moment of inertia, α is angular acceleration), much higher acceleration can be achieved if the moment of inertia is smaller. The moment of inertia used in the computation actually comprises 2 parts: the moment of inertia of the motor, and the moment of inertia of the load.

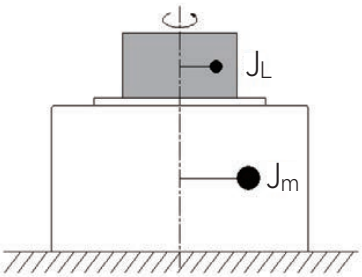


Illustration of motor inertia and load inertia

J = Jm + JL

where

Jm: Motor's rotor inertia

JL: Load inertia

In many cases, the moment of inertia of the motor actually contributes a large percentage of the total moment of inertia. This means that the motor torque is used mainly to rotate itself. Little torque is left for the load moment of inertia.

The rotor inertia of AXD is small. This means that more torque can be used to rotate the load, resulting in a more dynamic performance. Higher acceleration and shorter settling time can be achieved.

Low overall mass

The overall mass of an AXD motor is also smaller, compared to competitor's motors with similar size. Newton's second law (F = ma) tells us that for higher acceleration, either the force has to be larger or the mass has to be smaller.

The trend for the automotive industry is to make cars with lower body mass. Instead of using only steel, aluminum and carbon fiber are used to reinforce the car structure, to reduce mass. This results in better performance and higher fuel efficiency.

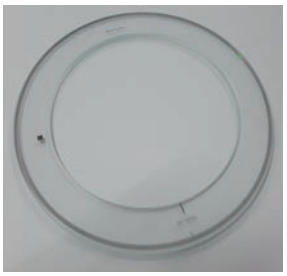
Similarly, for motors used in motion control, lower motor mass is an advantage, especially when you need to mount the torque motor on a XY table. The dynamics of the XY table is affected by how much load it has to carry. Lower applied force and higher accelerations can be achieved with lower moving mass.

Torque motor on a linear motor stage

High resolution optical encoder

The AXD torque motor uses a high resolution optical encoder for feedback. Optical encoders provide much better accuracy, repeatability and higher resolution, compared to resolvers.
The working principle of resolvers is based on rotating transformers. Other than the signal processing errors by converters, the inconsistencies in the construction of the windings affect the accuracy of the resolver.
For optical encoders, the divisions on the disk are etched with photographic and semiconductor techniques. The gratings can be made with fine pitch, such as 4, 20, 40 or 80 microns. This results in much higher accuracy.

Resolver construction



Encoder grafting

Large center hole

AXD torque motors are designed with a large center hole. The center hole is sometimes needed for optics design, wiring or pneumatic/vacuum tubing.

Higher speed

AXD torque motors are designed for higher speeds. This means that even for indexing motions, the AXD can perform the motion in a shorter time, compared to a motor with limited maximum speed.

Stages & Systems

The Akribis precision linear motor driven stage features the patented AUM series ironless linear motor in a neat, ready to use solution. Being directly driven, the linear motor stage eliminates intermediate transmission mechanism which translates directly into many benefits, including

Fast response in the form of faster acceleration (up to 25G) and settling time, which increase the throughput

High speed up to 5m/s result in shorter cycle time.

High stiffness as no mechanical transmission such as gears, belt, ball-screw, etc., are required. The driving force is directly coupled to the load.

High precision by using direct measurement systems. Distance/angle conversion is not needed.

Zero backlash as a result of direct coupling of the driving force to the load.

The structural frame of the linear motor stage is extruded aluminum, offering good structural strength and cost effective. These stages can be constructed in single piece up to 3 metres without the need for joining.

The geometrical accuracy of the stage is achieved with the use of a preloaded dual-rails-quad-runner blocks or single-rail-dual-runner blocks re-circulating linear motion ball bearing system. The runner blocks are preloaded for better stiffness, and only the ball cage types are selected to deliver a smooth and low noise motion.

The displacement accuracy is achieved with the use of a direct measurement system, consisting of a linear scale (with scale linearity controlled at +/- 3 micron/metre) and a linear encoder. The electrical resolution can achieve sub-micron level accuracy.

Thanks to the wide range of sizes, force ranges and travel strokes, linear motor modules find application in a variety of fields as per below:

Pick and place
Laser marking / machining / spot welding
Dispensing
Inspection
Printing

Sizing Guide

Linear Motor Sizing Guide

1. Sizing of a linear motor includes calculating the peak force and Root-Mean-Square (RMS) force requirement.

2. Peak force is determined by the moving mass and maximum acceleration required.

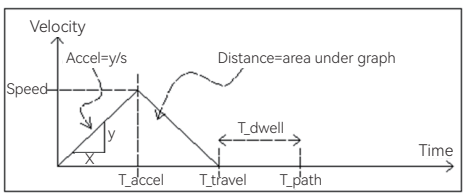
Force = Mass * Acceleration + Friction Force + External Opposing Force

For example, if moving mass is 2.5kg (including coil assembly) and required acceleration is 30m/s^2, the motor needs to exert a force of 2.5 x 30 =75N. This is assuming Friction and Opposing Forces are negligible.

3. Very often, we do not know the actual required acceleration, but we have the motion time requirement. We can calculate the required acceleration if we know the travel distance and the travel time. Usually for short travel distance application, a Triangle-Shape Velocity Profile is used whereas for long travel distances, it is more efficient to use Trapezoidal-Shape Velocity Profile. In a Triangle profile, the motor does not cruise at any velocity.

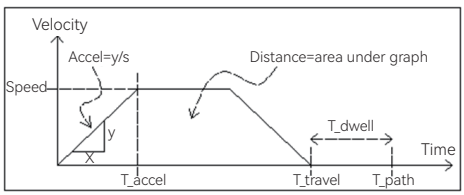
4. For Triangle Profile:

Acceleration = 4 * Distance / Travel Time^2



5. For Trapezoidal Profile, a desired cruising speed will help to determine the required acceleration.

Acceleration = Cruise Speed / (Travel Time - Distance / Cruise Speed)



6. Basically, the calculation of the deceleration is similar to the acceleration, unless there is an unbalanced force (E.g. gravitational force) acting on the motor.

7. Force required by the motor during cruising (against friction and opposing forces) and dwelling (against opposing force) may also be calculated.

Note: In order to maintain a constant speed, the motor will resist friction and external force. When the motor is stationary and enabled by a driver, it will resist the external force.

8. Compute the RMS force using the formula below.

$$F_{cont} = \sqrt{\frac{F_a^2 \cdot t_a + F_c^2 \cdot t_c + F_d^2 \cdot t_d + F_w^2 \cdot t_w}{t_a + t_c + t_d + t_w}}$$

F_{cont} = Continuous Force

F_a = Acceleration Force t_a = Acceleration Time
F_c = Cruise Force t_c = Cruise Time
F_d = Deceleration Force t_d = Deceleration Time
F_w = Dwell Force t_w = Dwell Time

9. Select a motor according to the computed peak force and RMS force requirement. User should factor in a safety factor of at least 20-30% especially when the friction and external opposing forces are assumed to be zero.

10. For example, an application requires the motor to move a 4kg load for 0.3m in 0.2s using Triangle Profile. The motor will dwell 0.15s before moving the same cycle again. Assume friction is negllgible and no presence of any unbalanced force.

Acceleration = Deceleration = 4 * 0.3 / $(0.2)^2$ = 30m/s^2

Peak Force = Fa = Fd = mass * acceleration = 4 * 30 = 120N

$$F_{cont} = \sqrt{\frac{(120)^2 \cdot (0.1) + (120)^2 \cdot (0.1)}{0.1 + 0.1 + 0.15}} = 90.7\text{N}$$

Giving an additional 30% safety factor, a suitable motor will be AUM3-S4.

11. Motor selection software is available to automate the calculation process.
Please contact cust-service@akribis-sys.com for the software.

Voice Coil Motors

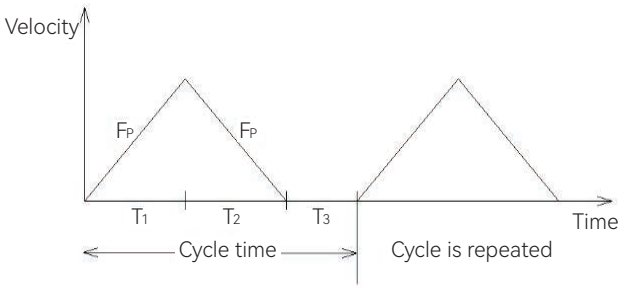
1. Peak force

In an application, it is important to determine the peak force and RMS force required. In order to select the right voice coil motor, the peak force is calculated by Newton's second law, F = ma. With a known moving mass, and the acceleration required for the motion profile, we can calculate the peak force required.

For example, with a moving mass of 100g, and an acceleration of 40m/s^2 , the peak force required during acceleration will be 4N.

2. RMS force

The RMS force is calculated with the equation:



$$F_{cont} = \sqrt{\frac{F_p^2 \cdot t_1 + F_p^2 \cdot t_2}{t_1 + t_2 + t_3}}$$

where

F_{cont} = Continuous Force

F_p = Peak Force

t_1 = Acceleration Time

t_2 = Deceleration Time

t_3 = Dwell Time

Using the example described above, if the stroke is 4 mm and if the time to complete motion is 0.02s, then the velocity will be 400mm/s, with an acceleration of 40m/s^2. The peak force will be 4N. If the dwell time is 0.05s. then

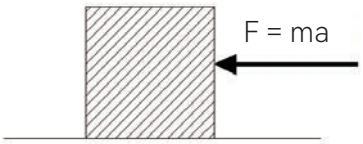
$$F_{cont} = \sqrt{\frac{F_p^2 \cdot t_1 + F_p^2 \cdot t_2}{t_1 + t_2 + t_3}} = \sqrt{\frac{4^2 \cdot 0.01 + 4^2 \cdot 0.01}{0.01 + 0.01 + 0.05}} = 2.14\text{N}$$

Hence, we can select a voice coil motor with a peak force that exceeds 4N and with a continuous force that exceeds 2.14N.

Direct Drive Rotary Motors

1. Peak torque and continuous torque

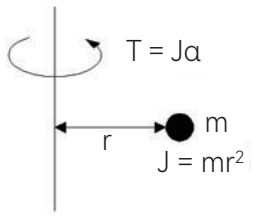
The torque ratings of a DDR motor must meet the torque requirements of the application. In other words, the peak torque and continuous torque of the motor must be higher than the peak torque and RMS (root mean square) torque of the application. Otherwise, the motor will not be able to accelerate as fast as needed, or the motor will over heat after some time.



Linear motion

For linear motion, by Newton's second law, F = ma, where F is the force needed to move an object in N, m is the moving mass in Kg, a is the acceleration in m/s^2.

Similarly, for rotary motion, T = Jα, where T is the torque needed to rotate an object in Nm, J is the moment of inertia in Kgm^2, and α is the angular acceleration, in radians/s^2.



Rotary motion

For an application, we can compute the peak torque and RMS torque required:

Peak torque during acceleration/deceleration, T=Jα

$$T_{cont} = \sqrt{\frac{T_a^2 \cdot t_a + T_c^2 \cdot t_c + T_d^2 \cdot t_d + T_w^2 \cdot t_w}{t_a + t_c + t_d + t_w}}$$

T_a = Acceleration Torque
T_c = Cruise Torque
T_d = Deceleration Torque
T_w = Dwell Torque

t_a = Acceleration Time
t_c = Cruise Time
t_d = Deceleration Time
t_w = Dwell Time

A motor should be selected based on the computed peak torque and RMS torque required. A safety factor of 20–30% may be used, especially if friction and external opposing torque are assumed to be zero in the calculation.

Akribis provides motor selection software, where the peak torque and RMS torque are computed automatically, and a motor is recommended after you key in the application parameters.

Akribis DDR motors are designed with very high torque density, providing higher peak torque and continuous torque compared to conventional motors design.

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2. Motor inertia - the smaller the better

In the torque equation, T= Jα, much higher acceleration can be achieved if the moment of inertia is smaller. The moment of inertia used in the computation actually comprises 2 parts: the moment of inertia of the motor and the moment of inertia of the load.

In many cases, the moment of inertia of the motor actually contributes a large percentage of the total moment of inertia. This means that the motor torque is used mainly to rotate itself. Little torque is left for the moment of inertia of the load.

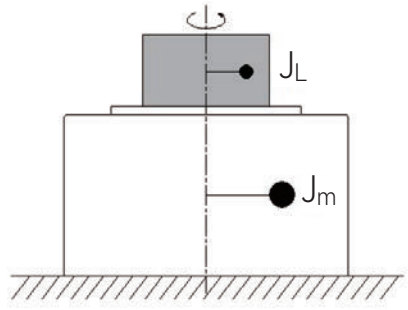


Illustration of motor inertia and load inertia

This often creates a dilemma for design engineers. The objective is to achieve a higher target performance, with higher acceleration, to reduce cycle time. Hence, higher torque is needed. In order to get higher torque, engineers need to select bigger motors with higher torque ratings. However, the bigger motor also comes with a larger motor inertia, and this result in higher torque is needed. The bigger motor may not meet the objective of achieving higher target performance after all.

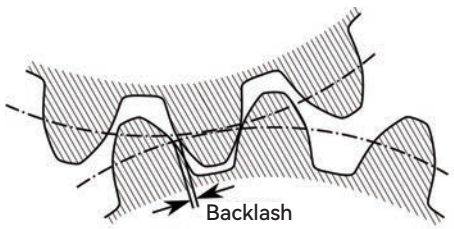
Therefore, a DDR motor with a smaller moment of inertia is an advantage. It should be noted that DDR motors with an outer rotor design will naturally have much higher moment of inertia.

Akribis ADR-A series motors are designed with optimal moment of inertia. The torque density to motor inertia ratio is excellent.

3. Does the moment of inertia of the motor have to match the moment of inertia of the load?

When using conventional servo motors with mechanical transmission systems, it is a common practice to match the motor inertia to the load inertia. Ratios of 1:5, or up to 1:10 are used. For DDR motors, it is not necessary to match the motor inertia to the load inertia.

In conventional servo motor applications, mechanical transmissions such as belts, pulleys, rack and pinion etc introduce backlash. Hence, during very small rapid motions when reversing direction of motion, the load may be decoupled from the motor for a short period of time. This creates instability in the control system. Inertia matching is used to solve this problem, so that the controller can operate in a stable manner.

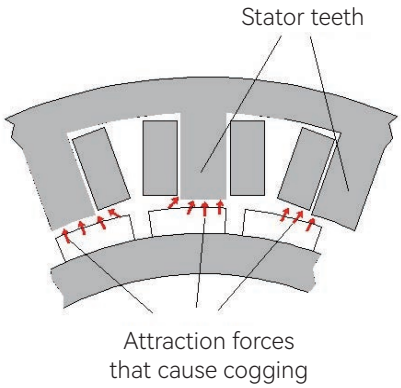


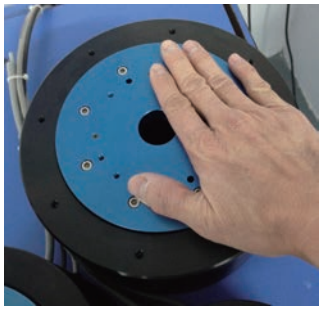
In a DDR application, the load is directly coupled to the motor without any transmission device, so there is no backlash. Consequently, there is no need for inertia matching.

4. Cogging or detent torque

DDR motors with teeth on the iron core laminations will have a cogging effect. The figure below illustrates cogging torque caused by the attraction force between the stator teeth and the magnets.

Cogging torque can be felt when you try to rotate a motor with your hand. You will feel some opposing force at certain positions.




Rotate motor by hand to feel cogging effect

The disadvantage of cogging torque is that it causes torque ripple during motion, which causes velocity ripple as well. Motion controllers can compensate the effect to a certain extent, but for slow speed applications where constant velocity is required, the effect of cogging will be detrimental.

Another disadvantage of cogging is that it affects motion settling performance, and jittering at target position.

Akribis ADR motor is designed with minimal cogging torque, due to the optimized slot/pole configuration, and the introduction of tooth tips in the stator laminations. The maximum cogging torque, peak to peak is published in our data specifications.

The ACD and ACW series motors are using coreless design, which means that they do not have any cogging torque.

5. Maximum speed

In fast motion application, the speed of the motor can be very high. Therefore, it is important to consider the type of windings required for the application, and ensure that the bus voltage from the amplifier is sufficient to overcome the back EMF voltage.

To put it simply, the bus voltage should be greater than the sum of the voltage generated by the back EMF, and the peak current multiplied by the terminal resistance of the motor:

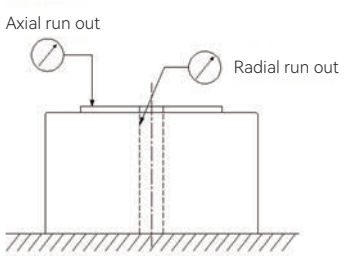
$$U_{bus(dc)} > \sqrt{6}\sqrt{\left(\frac{K_e \cdot n_{max}}{\sqrt{6}} + \frac{i \cdot R_{hot}}{2}\right)^2 + \left(\frac{\pi \cdot i \cdot L \cdot p \cdot n_{max}}{120000}\right)^2}$$

Symbol	Definition	Unit
$U_{bus(dc)}$	DC bus voltage	Vdc
K_e	Back EMF constant (line, peak value)	Vpeak/rpm
n_{max}	Max. angular speed	rpm
i	Peak current (rms value)	Arms
R_{hot}	Resistance (@working temperature, line)	Ω
L	Inductance (line)	mH

6. Axial and radial run out

The axial and radial run out of a DDR motor is determined by the precision of the bearing used, precision of the machined components and the assembly of the components. The axial and radial run out need to be considered for applications that require higher accuracy.

The axial and radial run out specifications of Akribis DDR motors are shown in the specifications sheet. Standard motors come with normal axial and radial run out values, while higher grade options are available for selection with precision level up to 5μm.



7. Feedback

Akribis DDR motors typically use optical incremental encoders for feedback. However, other options are available, such as resolvers, absolute encoders and inductive encoders. Optical incremental encoders offer better accuracy and higher resolution compared to resolvers.

All Akribis direct drive rotary motors are equipped with optical encoders. With higher encoder resolution after interpolation, Akribis rotary motors can satisfy your need of precision in any type of demanding applications.

For example, Akribis ADR135 motors are equipped with circular optical encoder scale. With 400X interpolation digital output, the motor can achieve 1202000 counts per revolution. With SINCOS (analog) output and 4096X interpolation rate from servo drive, the motor can achieve 12308480 counts per revolution.

Stages & Systems

1. Accuracy, repeatability and resolution

There are many ways to define the three confusing terms for accuracy, repeatability and resolution. Professor Slocum of Massachusetts Institute of Technology in his book "Precision Machine Design" [1], defines them in a very interesting manner namely:
"Accuracy is the ability to tell the truth"
"Repeatability is the ability to tell the same story over and over again"
"Resolution is how detailed your story is"
[1] A.H. Slocum. Precision Machine Design. Prentice Hall, Englewood Cliffs, New Jersey, 1992.

Typically, a servo positioning system consists of the mechanics (Main structural element and bearing guidance), power system (Motor and electronic components), feedback device and the controller. In short, accuracy has a dual meaning for a positioning system, namely:

Accuracy of the motion is contributed mainly by the bearings and it is the lateral deviation from the ideal motion path or the straight-line accuracy or parallelism of motion accuracy.

Accuracy is the ability of the servo system to reach the target position in which determined by the maximum error between any two points (The target position point and the actual target position) fall within the specified positioning system tolerance.

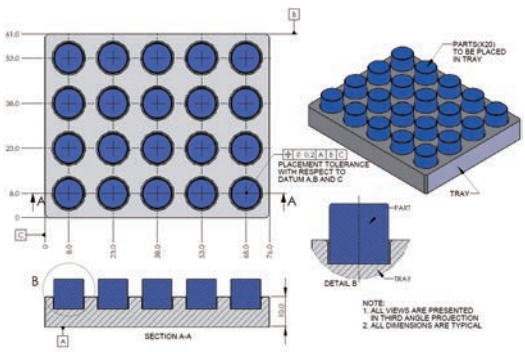
Like accuracy, repeatability has a dual meaning for a positioning system,namely:

Repeatability of the motion is the ability of the bearing to repeat its motion. For linear motion bearings, this is often referred to as the straight-line repeatability or repeatability parallelism of motion.

Repeatability is the ability of the servo system to reach the same position in which determined by the error when moving the load to the same position for multiple attempts within the specified positioning system tolerance.

Resolution in a position system currently is determined by the ability of the bearing to allow for a small increment of motion. It is the smallest mechanical step that the positioning system is capable of making during point to point motion. In other words, it will be meaningless to put an encoder with nanometer resolution on a positioning system with contact type bearing and hoping to achieve nanometer accuracy level for mechanical resolution. For contact type of bearings, 0.1 micron is by far the best achievable results.

The three terms are best illustrated with a pick and place example below. The objective is to place the cylinder into a tray as shown on the right.
The specifications indicate that we have to place the cylinder such that the centre of the cylinder is accurate to within a diameter of 0.2 millimetre, with respect to the three datums marked A, B and C.



In order to meet the specification, it is important that we select a position system with adequate resolution to achieve the require repeatability. The Table below shows a typical example on deciding the positioning resolution.

Description	Value
Tolerance (+/- 3 sigma)	= 0.2 mm
Required repeatability	= 0.2 mm/6 = 0.033 mm
Required resolution	= 0.033 mm/10 = 0.003 mm

Therefore, we should use an encoder with at least 3 microns resolution.

Now, if we successfully move the cylinder instead to the same position, we can note down the actual position ot the cylinder's centre via an independent measurement system. The centre of the cylinder can be plotted as in Figure 2 on the right.

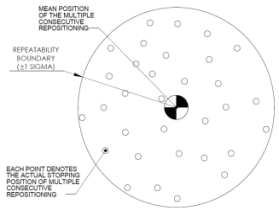


Figure 2: Actual stopping position of cylinder centre

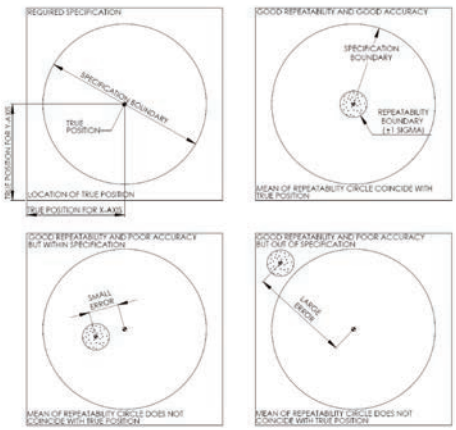


Figure 3: Specifications, Accuracy and Repeatability

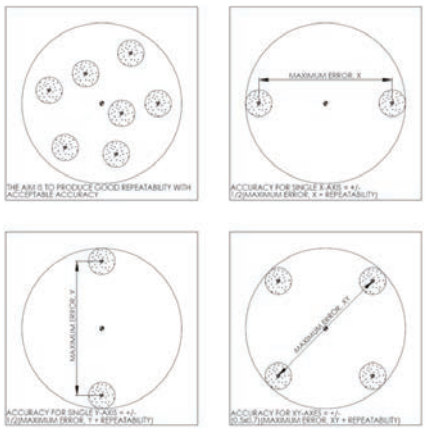


Figure 4: The aim is to produce good repeatability with acceptable accuracy

The mean position of the consecutive repositioning is marked by the centre of a circle which enclose all the points. The boundary of the big circle is the repeatability of the positioning system. Now if we superimpose the repeatability circle onto the given specifications as shown in Figure 3. In positioning system, it is much easier to achieve good repeatability than good accuracy. In many cases, the positioning is not required to be very accurate, repeatable positioning systems are capable to positioning within the required specifications given the proper positioning resolution as shown in Figure 4. It is economical to build a system which is repeatable and correct the accuracy using calibration and error compensation in the controller.

2. The relationship between force and speed

To relate the terms force and speed, let's take a look at the 7 common terms in physics when dealing with positioning systems, namely:

Description	Units	Symbol
Force	N	F
Load or mass	kg	m
Time	s	t
Acceleration	m/s^2	a
Velocity	m/s	v
Displacement	m	s
Torque	Nm	W
Power	Nm/s, Watt	P

This equation is known as the equation of motion and it gives the instantaneous value of the acceleration corresponding to the instantaneous values of the forces that are acting.

If an object starts moving from rest, its initial velocity is zero, the relationship between velocity and acceleration is given by the equation, $v = at$

Likewise, the relationship between displacement, velocity and acceleration is given by equation, $s = ½\ at^2$

When force is applied to an object or load and displaced (moved) it over a distance, the work done by the force during the displacement is related by the equation, $W = Fs$

When time comes into the equation, we have power which is the rate of doing work and it is related to velocity by the equation, $P = Fv$

Now, let's relate all these terms back to positioning systems. The objective of a positioning system is to position a tool (which is the load) with respect to a workpiece. We are always concerned over how fast (which is related to time) we can perform this task of moving (which is displacement) the tool to the workpiece (which is the work to be done). To do this work, there are many types of motors available.

The capacity of a motor is measured by the rate in which it can do work or deliver energy. The total work done or energy output is not a standard measurement of the motor capacity. A motor no matter how big or small can deliver a large amount of energy if given sufficient time. On the other hand, a large and powerful motor can deliver a large amount of energy in a short period of time. In other words, if we want to travel from one point to another, we can reach that place travelling either in a small car or a big car. The only different is how long to reach the place when the same route is used. Similarly, a sport car can reach a speed of 100km/h in 5 seconds and within a very short distance. A family car can also reach 100km/h, but maybe in 12 seconds and need a longer distance. The different is in the capacity of the engine which can produce more power to accelerate the mass of the car in a very short time, thus over a very short distance.

Given the same load and travel distance, a bigger motor will be able to accelerate its load in a shorter time and at a higher velocity when compared to a smaller motor.

Precision Stages Drive and Control Solutions Recommendations

Akribis CASD		AC/DC power supply Pulse, velocity simulation or current mode EtherCAT
Agito AGM800		Real-time synchronized control for up to 8 axes with 61 μs servo sampling time. 16kHz servo sampling rate, less than 8ns synchronization jitter.
Agito AGD155 / AGD101		AC/DC power supply EtherCAT 16kHz servo sampling rate
Agito AGD301		High performance 3-axis centralized motion servo driver, up to 90Vdc, 9Arms continuous current per axis. 16kHz servo sampling rate, ideal for highly coordinated applications.
Akribis SASD		DC power supply The smallest size is 56×53×32mm (Greater power density). High EMC performance, compliant with medical industry requirements.
Mitsubishi MR-J4 / MR-J5		AC power supply Pulse, SSCNETIII/H network mode/EtherCAT Power rating up to 22KW
Panasonic A5L / A6L		AC/DC power supply Pulse, velocity simulation or current mode/EtherCAT
Copley Xenus / Plus / Accelnet		AC/DC power supply Pulse, velocity simulation or current mode/EtherCAT
Trust Automation TA115 / TA310 / TA330		Linear amplifier Velocity simulation or current mode Low current ripple
ACS CMhp/xa		AC power supply Driver and multi-axis controller integrated Optional configuration Excellent servo performance
ACS SPiiPlusEC		Programmable motion controller EtherCAT network control Maximum support 64 axes Special motion trajectory planning function
ACS UDMmc		Maximum support 4 axes, 20A current PWM output 12V-80VDC input Support voice coil motors, brushless motors, and stepper motors Collaborate with ACS network controller

*Please contact Akribis Sales engineers for more details （cust-service@akribis-sys.com）.

Questions and Answers

1. What is the maximum payload that the motor can drive?

From Newton's law F = ma, the force applied is proportional to mass and acceleration. Hence, as long as the force can overcome fiction force, a heavy mass can be moved with relatively small force except that the acceleration of this mass will be small. For example, a AUM 2-S2 motor with peak force of 88N can move a 10Kg load with maximum acceleration of 8.8m/s^2 when moving horizontally.

2. How about the maximum payload in vertical orientaiton?

In vertical movements, the motor needs to overcome gravity in addition to providing force for upward vertical motion (F = mg + ma). In this case, the maximum load is determined by the maximum force divided by 9.81m/s^2. If the vertical force has to be sustained continuously, the maximum load will be the continuous force of the motor. For example, the maximum vertical load for AUM2-S2 motor will be 2.2Kg, since the continuous force for this motor is 22N. If the load is supported by a counterbalance (such as a spring), then the AUM2-S2 motor can move a heavier load in a vertical position.

3. What is the maximum speed of a motor or module?

There is no theoretical limit for the speed of a linear motor because there is no contact. However, the speed is typically limited by the mechanical bearings. For example, for linear guidance system using rails and runner blocks, the maximum speed is typically limited to 5m/s. This is why in most applications, the speed for linear motors is limited to 5m/s. An option of using ceramic ball bearings allow speeds of up to 10m/s. Using air bearings also enable higher speeds to be possible.

4. How about the maximum acceleration?

For acceleration, as explained by Newton's law (F = ma), it is dependent on the maximum force (peak force) of the motor as well as the mass to be moved.

5. What is the maximum length that a linear motor can reach?

There is no length limitation for AUM, ALM and AKM linear motors as both their motor tracks and the linear rails can be extended by joining sections together. Additionally, the linear scale for encoder feedback is available in long lengths enabling motor setups of 20 meters or more. In contrast, RDM rod motor uses a single piece magnet track enclosed by end caps which prevents track extension. Therefore, the required length must be defined during design phase.

6. What happens to a linear motor when power is cut off suddenly?

In the event of a sudden power failure, the linear motor will continue to move forward due to inertia until it collides with the end or stops due to friction. Usually, this is not a problem, but there may be safety concerns in some applications.

In general, a braking device can be installed to activate when the power is cut off, so that the motor can stop immediately. This type of braking device is usually mounted on the guide rail of a linear guide system.

7. Is linear motor suitable for clean room applications?

Yes, linear motors can be used in clean room environement. In fact, many front-end semiconductor applications have been using linear motors. For example, in wafer fabrication plants, high precision lithography machines use linear motors for very high precision XY position stage, with nanometer resolutions and sub-micron accuracy, in clean room class 10 facilities.

With linear motor gaining popularity in more applications, linear motors are now also used in other applications, such as semiconductor back end packaging, testing, pick and place, hard disk assembly and testing etc. Such applications are also being applied in a clean room environment.

The advantages of linear motor over traditional ball screw drives in clean room environment are:

- No contact in the drive actuator. Hence there is no wear and tear which causes particle generation
- No lubricant needed on the linear motor. Lubricants are a source of contamination

8. What is the effect of magnetic field from linear motors?

In some applications, there may be concerns about magnetic fields from linear motors affecting sensitive components. For such cases, ironless linear motors like AUM or ALM series are recommended as their closed magnetic circuit ensures the magnetic field outside the magnet track is negligible. In contrast, iron core linear motors (like AKM) and rod motor (RDM) do emit magnetic field within approximately 50-60mm of the magnet track. However, this field decays as the distance increases and remain constant and does not generate any RFI.

9.Ferrite bead

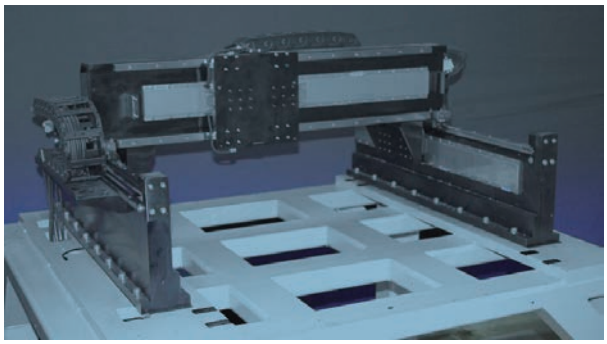
Ferrite beads (FB) are connected to the terminals of electric motors to filter the voltage spikes from the motor driver. Voltage spikes will cause insulation failure of electric motors. When the output voltage of the driver is not stable, the ferrite bead can protect the motor from being damaged by the voltage spikes.
In addition to ferrite beads, Akribis provides high quality cables with shielding layer and motor driver with high SNR (signal-noise ratio) to guarantee the high-performance of the motors.

10.Hall sensor

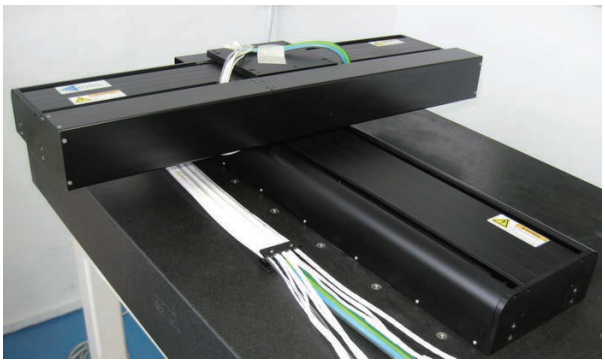
Hall sensors use the Hall Effect to output voltage signal indicating the position information of the motor mover. The motor driver can implement commutation of the motor based on this information. The combination of Hall sensor and high-resolution encoder can improve the accuracy of commutation. Akribis provides professional solutions of encoder commutation.

Motion Control of Gantry Stages

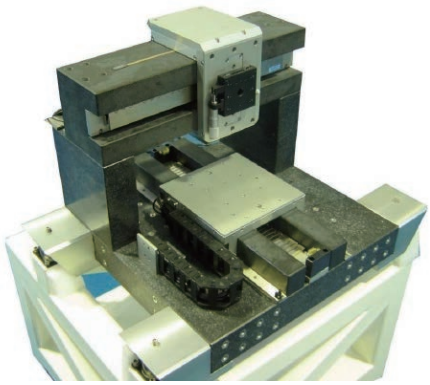
A gantry stage is basically an XY table where the top axis is supported by 2 axes at the bottom. The top axis and its payload is supported by 2 parallel linear bearings at the 2 sides of the stage. See picture on the right.
This configuration allows the top axis to carry an end effector (like pick and place mechanism, camera, etc.) to access the work piece at any XY positions from the top.



A standard stacked XY table will usually have to move the work piece while the end effector is fixed on top. This is usually not recommended if the work piece is very big and heavy, or if the top axis stroke is very long. Since the top axis is only supported at the middle, it would deflect downwards at the 2 ends (more significant as the top axis length increases), resulting in poor flatness specifications. (See picture on the right.)



A nice hybrid configuration is to separate the X and Y where the top axis is mounted on a stationary bridge. In this case, the bottom axis carries the workpiece in one direction and the top axis carries the end effector to move in the orthogonal direction. (See picture on the right.)



In motion control, we are more concerned on the bottom axis of the first type of configuration (moving bridge). The load is supported at the 2 sides, it can easily creates yaw error if the driving force is not in line with the CG (center of gravity) of the moving load.

In motion control, we call the bottom axis of such configuration as gantry axis.

1.Types of gantry axis configuration

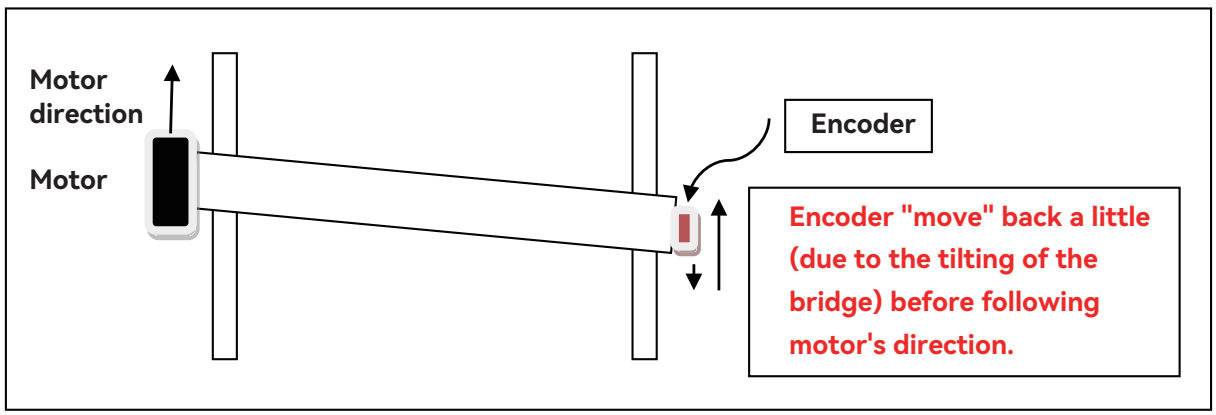
1.1 T-drive

T-drive is consists of a motor driving at one side, and linear bearing guiding the opposite site for the bottom axis, forming a T shaped configuration. This configuration requires only one driver and one encoder. It is the most cost effective gantry configuration.The ideal location for the encoder to be mounted is at the center of the gantry. However, this is hard to achieve. Most of the designs will have the encoder mounted on one side of the T-drive configuration.

The main disadvantage of this configuration is the unbalanced driving force. It is almost impossible to drive in line with the CG of load. This will result in high yaw error. The side without motor will always be dragged behind by the motor at the other side. When the motor changes direction, there will be big yaw error which result in high reversal error. In other words, the side without motor will remain stationary until the motor side has moved enough to drag it along.

To improve repeatability of this configuration, the recommended approach is to have the critical positions always in the same direction of the motion. This could mean over travelling in one direction then move back to the required direction. This would produce similar yaw error every time so that this yaw error doesn't contribute to the repeatability error of the gantry axis.

One important consideration in a T-drive configuration is the location of encoder with respect to the motor driving force. If it is opposite to the motor driving force, the encoder may register an opposite direction motion before it starts to follow the motor direction (see illustration below). This is, in a way, like a positive feedback situation that could affect servo performance. So, it is recommended to have the encoder at the same side of the motor.



1.2 H-drive

H-drive is consists of 2 motors, 1 driving each side of the gantry, forming a H shaped configuration. This would provide a more balanced driving force and minimize the problems experienced in T-drive configuration.

2.Encoder configurations

For H-drive configuration, there are options to use 1 or 2 encoders.

2.1 Single encoder

In single encoder configuration (again, usually mounted at one side of the gantry), both motors would receive the same feedback signal and have the same position error all the time. Essentially, both motors will output the same force all the time. However, this doesn't guarantee that there will be no yaw error because the load inertia and friction experienced at the 2 sides will not be the same. But generally, having motors driving at both sides would reduce the reversal error significantly as compared to T-drive configuration.

In this configuration, it is possible to use only one driver if the driver's current rating can drive the 2 motors connected in parallel. However, there will be only one hall sensors port in the driver, so the 2 motors must be aligned exactly to their respective magnetic tracks to ensure accurate commutation.

2.2 Dual encoders - one on each side of gantry

Having encoders at both sides of the gantry would provide actual position difference between the 2 motors. However, this would require 2 separate position loops to control the 2 motors, it would require 2 drivers.

With 2 encoders, the stopping position can be controlled to the accuracy and repeatability of the encoders.

3.Rigid vs flexible link between the bridge and the gantry axis

In single encoder system, either T-drive or H-drive configuration, the bridge should be rigidly mounted on the gantry axis to minimize yaw error.

However, there are important factors for consideration in rigid link design.

3.1 Bridge length is fixed and fully constrained when rigidly mounted at the 2 ends

If the environment temperature changes, the top axis bridge will expand or contract. More importantly, the moving axis mounted on the bridge will generate heat and dissipate through the bridge. As the bridge length changes (it will be more significant if the bridge is long), the stress on the 2 linear bearings will increase, resulting in higher friction on the gantry axis. The bridge itself may also bend and twist which will affect the top axis as well.

3.2 Mechanical alignment of the 2 linear bearings

If the 2 bearings are not parallel or their straightness and/or flatness are not controlled, it would result in uneven friction across the full stroke of the gantry axis. Some part of the stroke will have higher friction than other parts. This could affect servo performance and require higher driving force from the motors than the calculated force requirement.

It can be very costly to machine the base support of the gantry stage to the required accuracy if the gantry is big (sometimes may not be possible at all).

On the other hand, most rigidly mounted bearings will still have some small degree of compliance to allow some displacement in the orthogonal directions. So the performance (or if it is functional at all) depends on the machining accuracy, bearings clearance, gantry size, etc.

3.3 Rigid link with dual encoders

With 2 encoders, it will provide the Yaw error (position difference between the 2 motors) to the controller. However, the assembly error of the 2 encoder scales and the scales' error itself could result in similar effect as misaligned bearings. In this case, the controller will try to servo the 2 motors to the commanded position. So if there is encoder scale error and bridge length is fully constrained, the controller will output very high current to the motors trying to stretch, bend or twist the bridge in order minimize their respective position errors. The 2 motors will be fighting each other and result in instability and higher continuous force.

One way to handle the difference in encoder scale error (including assembly alignment tolerance) is to map the differential error in one of the driver to match the encoder reading of the other. In this case, the bridge will be at their naturally "relax" orientation (no fighting between the gantry motors). But this doesn't mean that the yaw error is zero. In fact, it is impossible to achieve zero yaw error all the time in rigid gantry unless the mechanical setup (parallelism, straightness, flatness, etc.) is perfect.

3.4 Flexible link

Flexible link means allowing some freedom in yaw direction at one side (usually called the gantry master), and on the other side, allow translational freedom in the top axis direction and yaw rotation (to allow expansion/-contraction of bridge and rotation due to straightness error in gantry bearings and encoder scale error).

It requires 2 encoders and 2 controller axes (2 drivers) in order to control the yaw direction.
This is more costly in terms of the number of control components, but allows higher tolerance in the mechanical parts fabrication and assembly.

4.Controller configuration

In single driver configuration, the controller will see the gantry as one motor and everything behave like a conventional axis. It is more important to size the driver and power supply based on the combined motor current and back EMF.

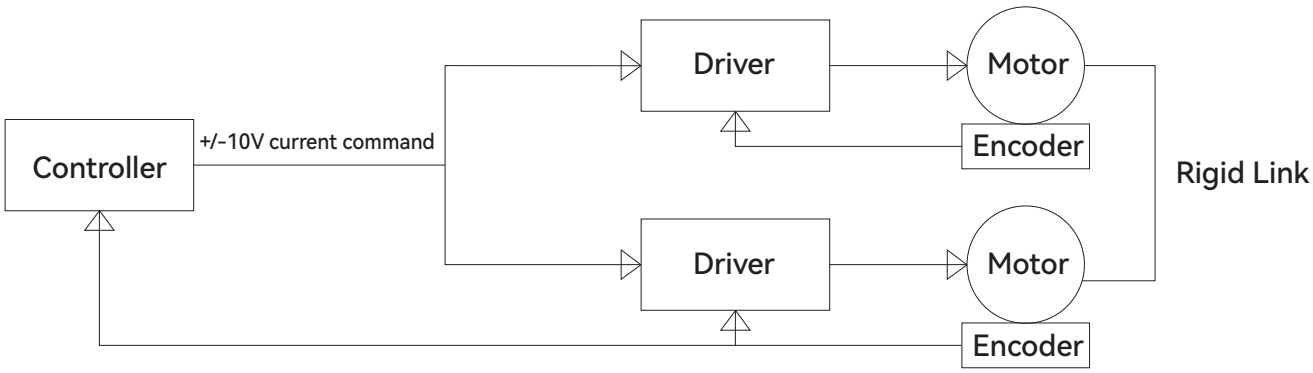
In dual-driver configuration, there are a few options.

4.1 Shared current command

This is similar to connecting the 2 gantry motors in parallel to a single driver with 1 encoder feedback. In the case when the driver's current or voltage rating could not support the 2 motors in parallel connection, it will be necessary to drive the motor separately with 2 drivers.

The controller treats the gantry as a single motor with only 1 position loop. The encoder feedback is used to compute current command and converted to a +/-10V analog signal, which is connected in parallel to the 2 drivers. Both motors should output the same force if their commutation alignment is the same.

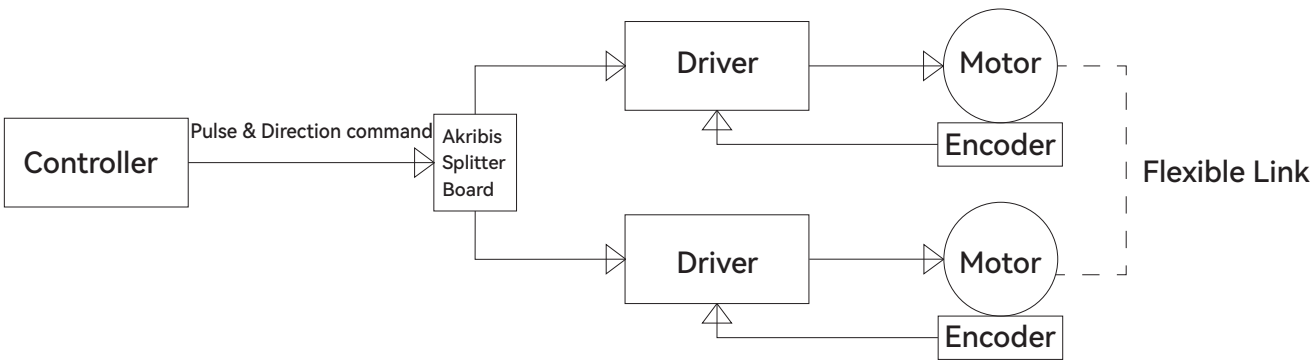
In the case when it is not easy to ensure good commutation alignment by mechanical design, it is possible to use separate encoders connected to their respective drivers for commutation purpose. Only one of the encoders will be connected to the controller since there is only 1 position loop.



4.2 Shared position command

Similar to shared current command, in this case, the 2 drivers are operating in position mode. The position command can be sent in pulse & direction or other equivalent formats. To ensure strong pulse signals are received at the 2 drivers, it is recommended to use a splitter circuit board from Akribis to split the signals.

Again, the controller treats this as a single motor and generate one motion path profile. Position control is done in the drivers, so it is possible to apply encoder error compensation separately in each driver to avoid fighting between the 2 motors.

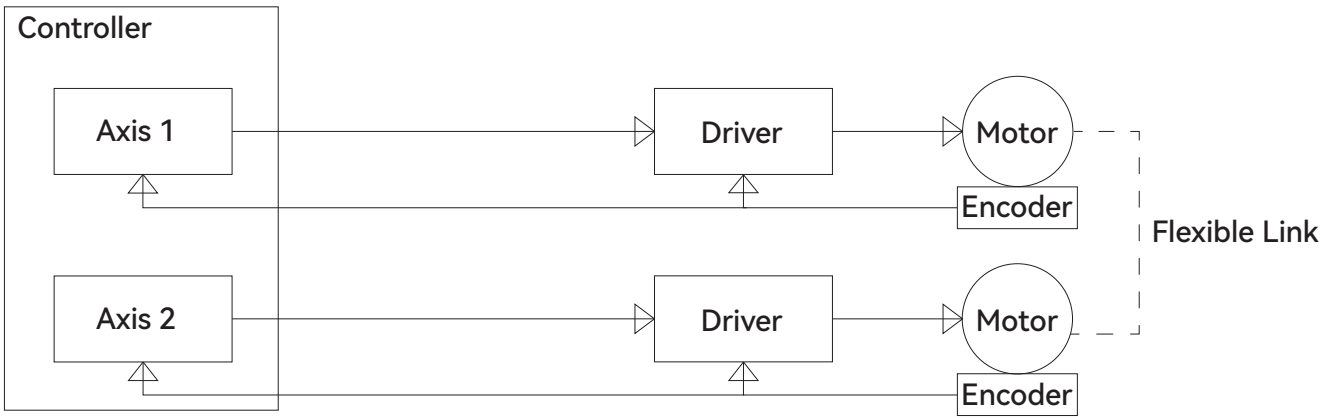


4.3 Vector mode or gear mode with 1:1 ratio

When the 2 drivers are connected to separate axes in the controller (this will take up 2 controller axes), it is possible to control the 2 motors separately. This may be necessary if the application requires some movement in the yaw axis (not always orthogonal to the main gantry axis). Of course, this would require a flexible link gantry design.

When moving in the main gantry direction, it is advisable to group the 2 axes in vector mode or gear mode because most controller has special error handling in such mode to decelerate and stop both motors together even if only one of the motors encountered an error condition.

If there isn't such protection in place, when one motor encountered error and stopped, the other may continue to move and could cause damage to the gantry mechanism.

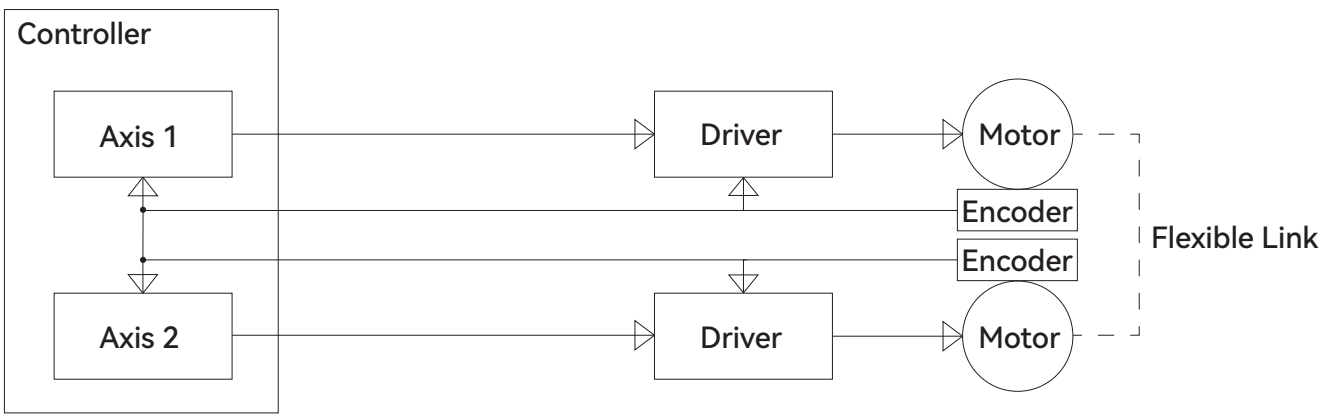


4.4 Active yaw control

With 2 complete sets of motor, encoder, driver and controller axis, it would be better to share both encoder signals among the 2 position loops so that each motor is aware of the actual position of the other motor.

For example, when one motor is slowed down by high friction, the other motor can also slow down to reduce the yaw error. The controller is actively trying to correct the yaw error at all time, hence the name "active yaw control".

Most advanced controllers like Elmo, ACS and Polaris support active yaw control, refer to next section for more description.



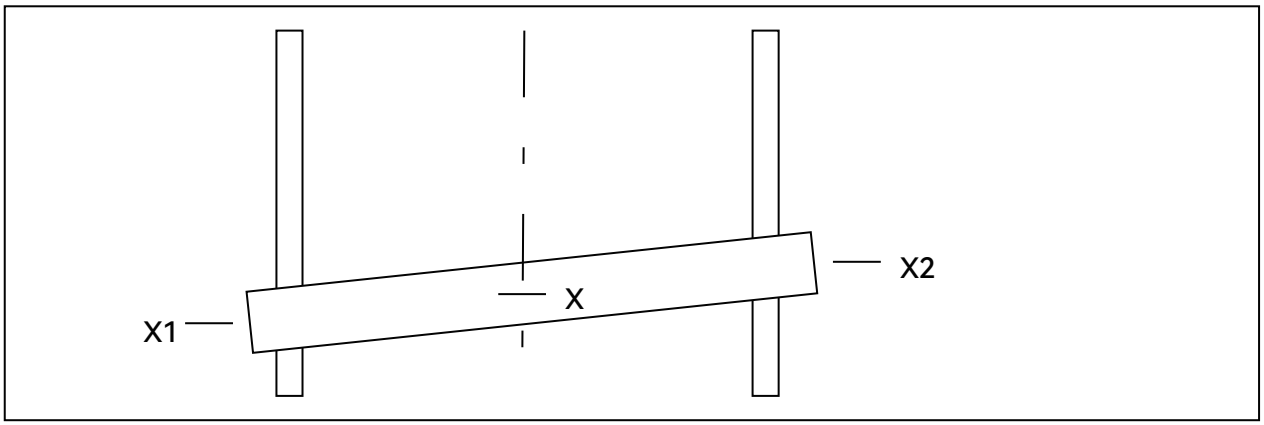
5.Active yaw control

Active yaw control requires 2 sets of motor, encoder, driver and controller axis.

The controller transforms the 2 physical gantry axes (X1 and X2) into gantry main axis (X-axis) and a Yaw-axis based on the following equations.

X = (X1 + X2) / 2

Yaw = X1 - X2



The controller generates motion profile to X axis (which is effectively the desired position at the mid-point of the bridge) while the yaw command should always be zero (that means the bridge is orthogonal to X-axis).

After transforming the X1 and X2 encoder values into X and Yaw's feedback values, the position and velocity control loops (PID, PIP or any other control structure) are processed to output the required current command to X and Yaw axis. These current commands will be transformed back to X1 and X2 axis and send to the current loop of their respective driver.

In this way, X1 and X2 motor will output different force to correct any yaw error while moving the gantry according to the required X-axis profile.

In case of rigid gantry (or less flexible gantry link), it is recommended to set a weak yaw controller by reducing the control gains for Yaw-axis or limit the current command to Yaw-axis. It will be useless (or even harmful) to output strong yaw control to a rigid gantry as the motors will not be able to correct the yaw error due to the rigidity of the gantry.

DUAL GUIDE MODULES

DUAL GUIDE MODULES

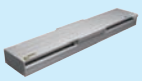
Overview

Akribis dual guide modules are compact and highly performance, comprised of linear motors, mechanical guide rails, encoders and covers.

Standard modules include DGL series dual guide linear motor module and DGC series dual guide economic linear motor module. Modules equipped with Akribis' high performance ironless AUM series and iron core AJM, AQM and AKM series motors provide high precision, high response, high rigidity, high stability, maintenance-free, and cost-effective advantages. Akribis provides customers with a wide selection of specifications.

For specialized applications requiring high vacuum or dust-free conditions, please contact Akribis sales engineers (cust-service@akribis-sys.com).

Dual Guide Modules



DGL Series

Dual guide linear motor stage
- Optional both ironcore and ironless linear motor options
- Stroke from 100mm to 1200mm, customized stroke up to 100m
- Optional resolution of 0.05μm or 0.1μm, minimum resolution up to 2.44nm
- High precision and precise homing
- Velocity up to 5m/s, acceleration up to 10G or higher

▶ Applicable to:
- Point-to-point micron/nanometer level positioning
- High/low speed applications with demanding velocity ripple or motion profile requirements
- Precise force control

★ Applications:
Front-end and Back-end wafer transport and inspection equipment. Solar PV, lithium battery, LCD display, bio-medical equipment, industrial printer and laser manufacturing scenarios which require high velocity, high precision, harsh trajectory following and velocity ripples.

DGC Series

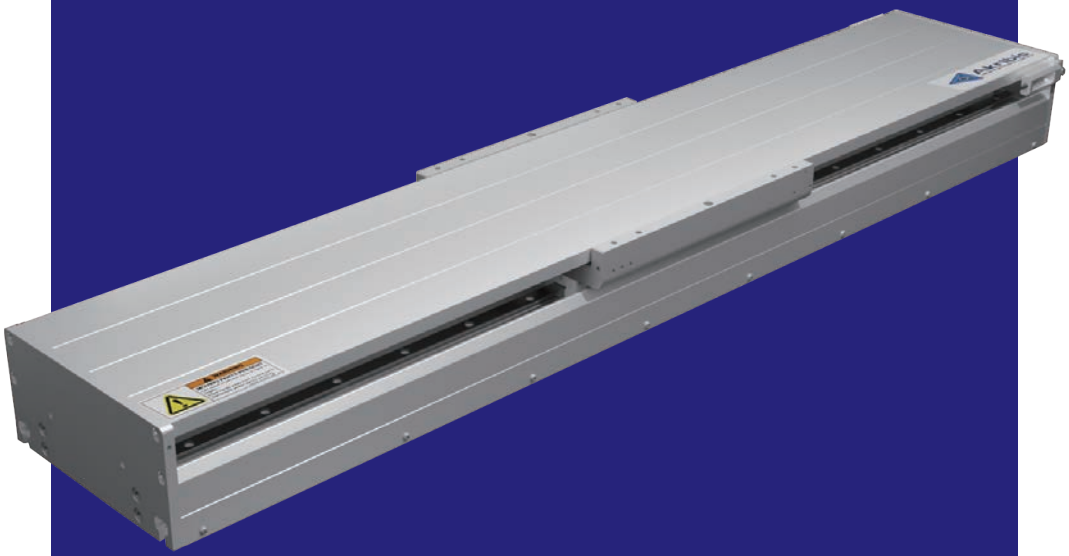
Economical dual guide linear motor stage
- Built-in Ironcore linear motors
- Stroke from 100mm to 1400mm, customizable
- Optional resolution of 0.05μm, 0.5μm or 0.1μm
- Aluminium profile base, fewer parts, economical configuration

▶ Applicable to:
- Point-to-point micron level positioning
- High/low speed handling for long/short strokes

★ Applications:
Electronic semiconductors, photovoltaic and lithium batteries, glass and LCD panels, medical equipments, industrial printing machines, laser processing, precision assembly and other equipments and production lines that require high speed and high precision positioning for handling situations.

Product Type		Repeatability (μm)	50N	100N	500N	1500N	2000N	2500N	3000N	3500N
DGL	AJM	up to ±1		Fcn=68.1N~446.8N Fpk=214.7N~1409.1N						
	AUM	up to ±1								
DGC	AQM	up to ±2			Fcn=60.8N Fpk=149.2N				Fcn=35.2N~393.0N Fpk=176.0N~2830.0N	
	AKM	up to ±2					Fcn=108.4N~722.6N Fpk=241.6N~1610.5N			

Applications: Used in electrical and semiconductor manufacturing, solar PV and lithium battery manufacturing equipment, LCD display, hard disc, PCB, high precision manufacturing, CNC, automotive electronics, packaging, printing, optics and bio-medical industry etc.



DGL SERIES

- Linear motor positioning system
- Excellent force / size ratio
- Precise homing
- Standard design

EN-25.5.1

DGL Series

Introduction

Akribis DGL series utilize direct drive linear motor positioning system. It consists of dual linear guides, linear motor, encoder feedback and aluminium cover to form a compact high-performance module.

The linear motor in the DGL is using Akribis' patented AUM series ironless linear motor or AJM series iron core linear motor. The AUM linear motor has no cogging, suitable for velocity control and scanning applications. AJM series has iron core, suitable for point-to-point motion control and it is more cost-effective compared to AUM series.

F_{cn} (Continuous Force) = 35.2N~446.8N
F_{pk} (Peak Force) = 176.0N~2830.0N

Features

- Optional built-in linear motor
- Stroke from 100mm to 1200mm, customized stroke up to 100m
- Repeatability up to ±1μm
- Optional resolution of 0.05μm or 0.1μm
- High precision and accurate homing
- Velocity up to 5m/s, acceleration up to 10G or higher

Applications

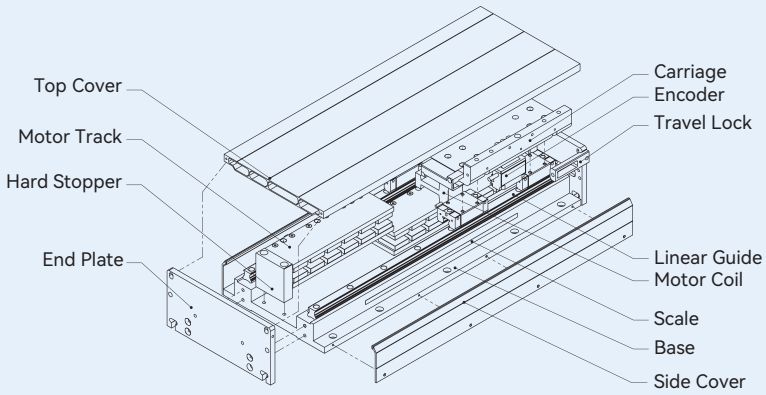
Suitable for point to point micron level fast positioning, can satisfy 5m/s velocity or higher, stroke unlimited (100m or longer).

Transport and fast positioning in electronics, semiconductor, solar PV, lithium battery, LCD display. And industrial printer and laser manufacturing scenarios which require high velocity, high precision, harsh trajectory following and velocity ripples.

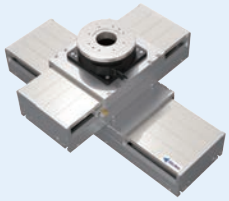
Dual Guide Modules Series	Linear Motor Series		Continuous Force (F_{cn}) / Peak Force (F_{pk}) Unit: N (50 / 100 / 500 / 1000 / 1500 / 3000)	Stroke (mm)[1]	Repeatability (μm)	Page
DGL150	AJM30	AJM30-B2	68.1 / 214.7	100 ~ 1200	up to ±1	038
		AJM30-B4	136.2 / 429.4			039
	AUM2	AUM2-S4	35.2 / 176.0			040
DGL180	AJM50	AJM50-B2	117.0 / 369.0	100 ~ 1200	up to ±1	043
		AJM50-B4	234.0 / 738.1			044
	AUM3	AUM3-S2	57.0 / 289.0			045
		AUM3-S4	113.0 / 578.0			046
DGL200	AJM80	AJM80-B2	174.5 / 550.2	100 ~ 1200	up to ±1	049
		AJM80-B4	348.9 / 1100.4			050
	AUM4	AUM4-S2	110.0 / 624.0			051
		AUM4-S4	211.0 / 1248.0			052
DGL260	AJM100	AJM100-B2	223.4 / 704.5	100 ~ 1200	up to ±1	055
		AJM100-B4	446.8 / 1409.1			056
	AUM5	AUM5-S2	197.0 / 1415.0			057
		AUM5-S4	393.0 / 2830.0			058

Note:
[1] Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

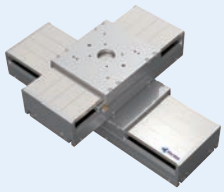
Exploded View



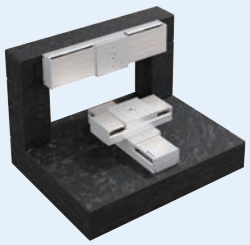
DGL Application Scenarios



XYT Stack



XY Stack



Fixed Gantry

DGL150 Ironcore & Ironless Series

		DGL150 Ironcore Series		DGL150 Ironless Series
Motor specifications	**Unit**	**Value**		
Motor	-	AJM30-B2	AJM30-B4	AUM2-S4
Continuous Force (NC) @100℃ ❶	N	68.1	136.2	35.2
Peak Force	N	214.7	429.4	176.0
Force Constant ±10%	N/Arms	29.6	29.6	22.0
Back EMF Constant ±10%	Vpeak/(m/s)	24.2	24.2	18.0
Resistance (L-L) @25℃ ±10% ❷	Ω	3.9	2.0	13.17
Inductance (L-L) ±30% [AJM] ❸ Inductance (L-L) ±40% [AUM] ❹	mH	16.5	8.2	3.88
Continuous Current (NC) @100℃ ❶	Arms	2.3	4.6	1.6
Peak Current	Arms	9.0	18.0	8.0
Max. Bus Voltage	Vdc	600	600	330
Magnetic Period	mm	20	20	30
Mechanical specifications	**Unit**	**Value**		
Effective Stroke	mm	100-1200	100-1200	100-1200
Resolution	μm	0.05/0.1		
Repeatability	μm	±1		
Horizontal Straightness	μm/mm	±2/100	±2/100	±2/100
Vertical Straightness	μm/mm	±4/100	±4/100	±4/100
No-load Moving Mass	kg	2.4	3.5	1.1
Maximum Bearing Load	N	3120	3120	640
Rated Payload	kg	10	20	20
Max. Static Moment	Nm	102	102	36

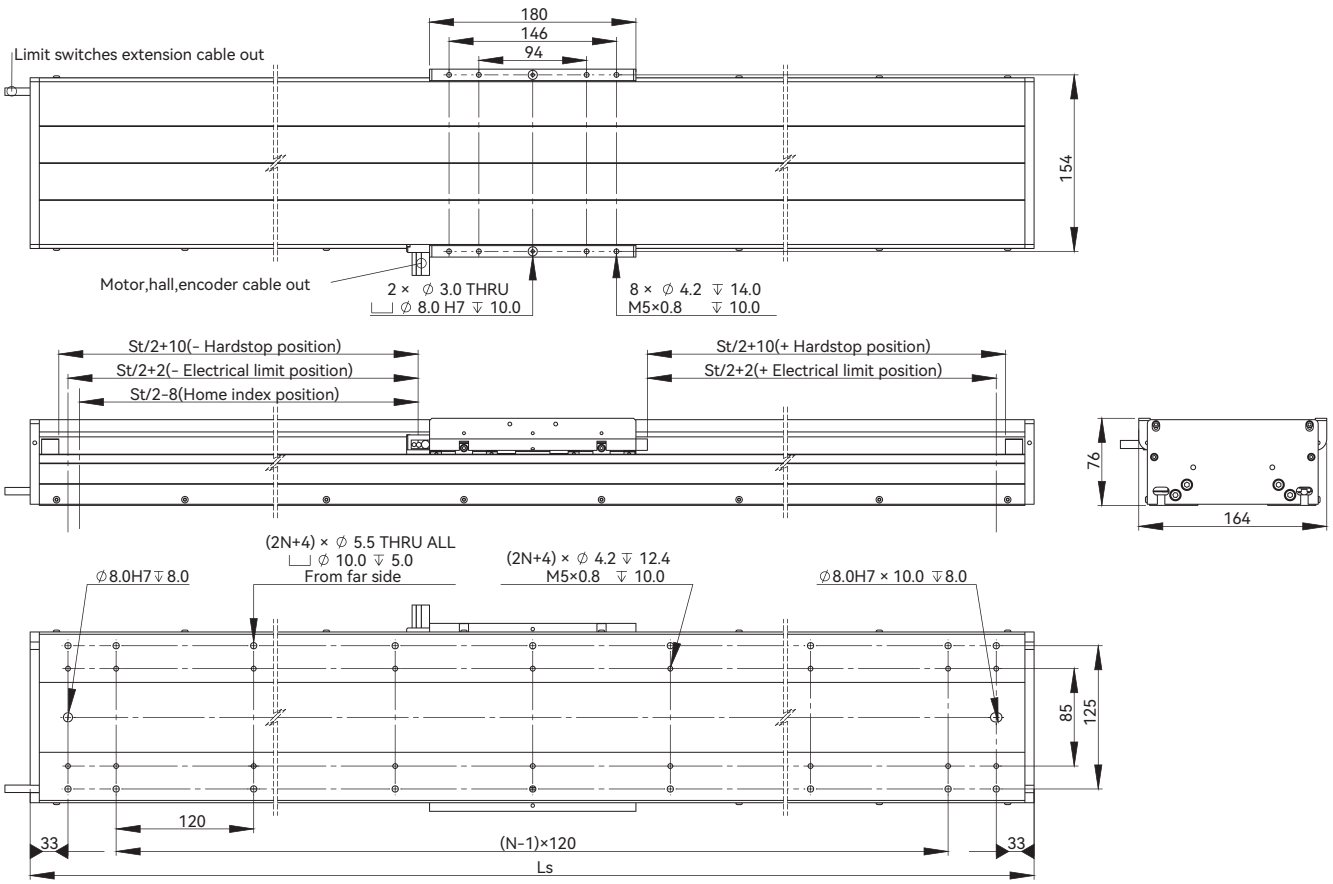
❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
❹ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

- All values are measured based on module fully mounted on a 5μm granite table.
- Values are measured according to Akribis measurement standard.
- All specifications above are standard, contact Akribis for special request（cust-service@akribis-sys.com）.

The contents of datasheet are subject to change without prior notice.

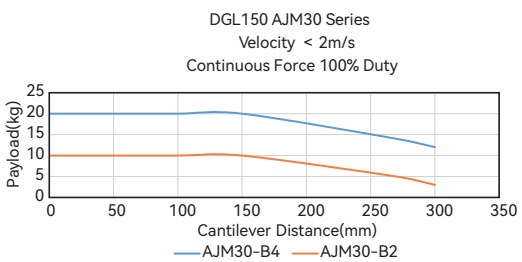
DGL150 Ironcore Series

DGL150-AJM30-B2 Dimensional Drawing

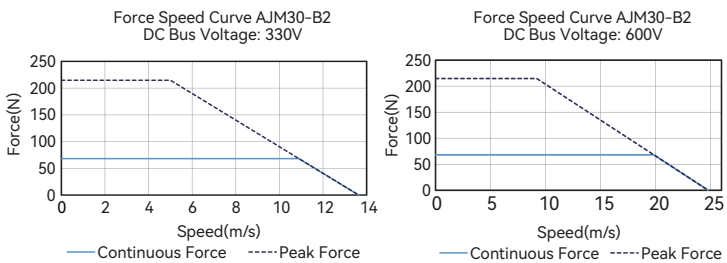


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	370	8.3
200	3	470	9.7
300	5	570	11.0
400	5	670	12.4
500	5	770	13.7
600	7	870	15.1
700	7	970	16.4
800	9	1070	17.9
900	9	1170	19.2
1000	9	1270	20.6
1100	11	1370	21.9
1200	11	1470	23.3

Cantilever-Payload Curve

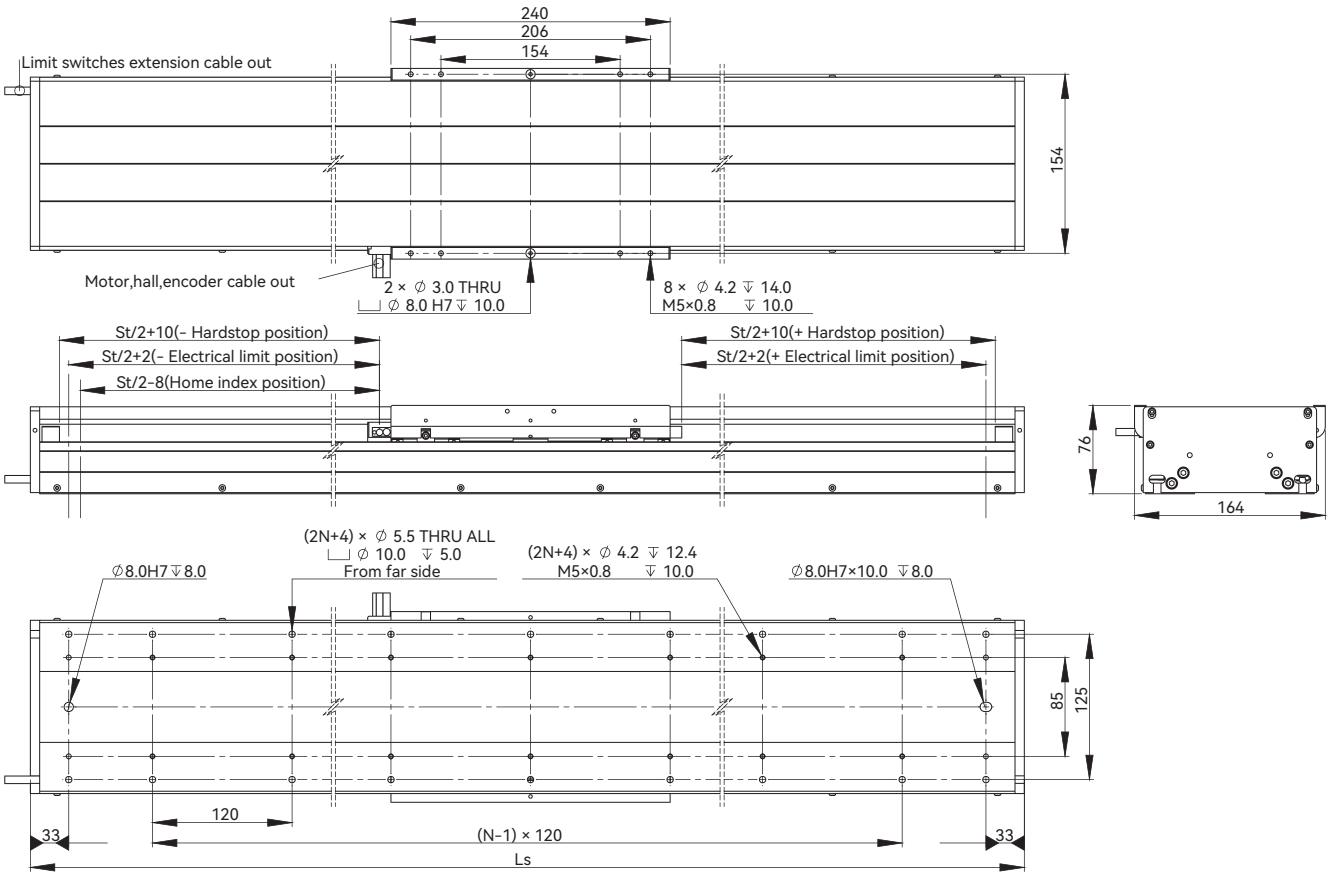


Force-Speed Curve



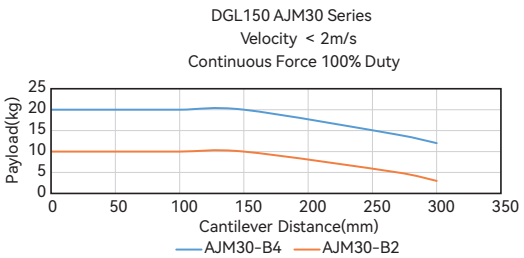
DGL150 Ironcore Series

DGL150-AJM30-B4 Dimensional Drawing

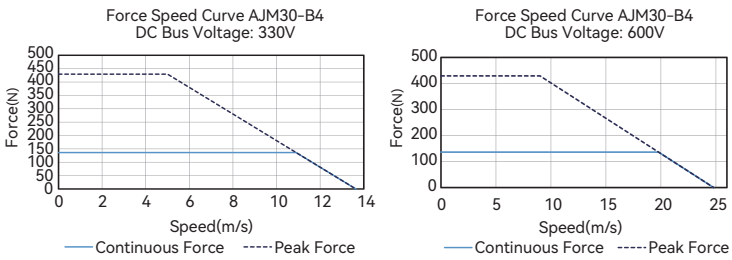


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	430	9.8
200	3	530	11.2
300	5	630	12.6
400	5	730	14.1
500	7	830	15.5
600	7	930	16.7
700	7	1030	18.2
800	9	1130	19.5
900	9	1230	21.0
1000	11	1330	22.3
1100	11	1430	23.7
1200	13	1530	25.1

Cantilever-Payload Curve

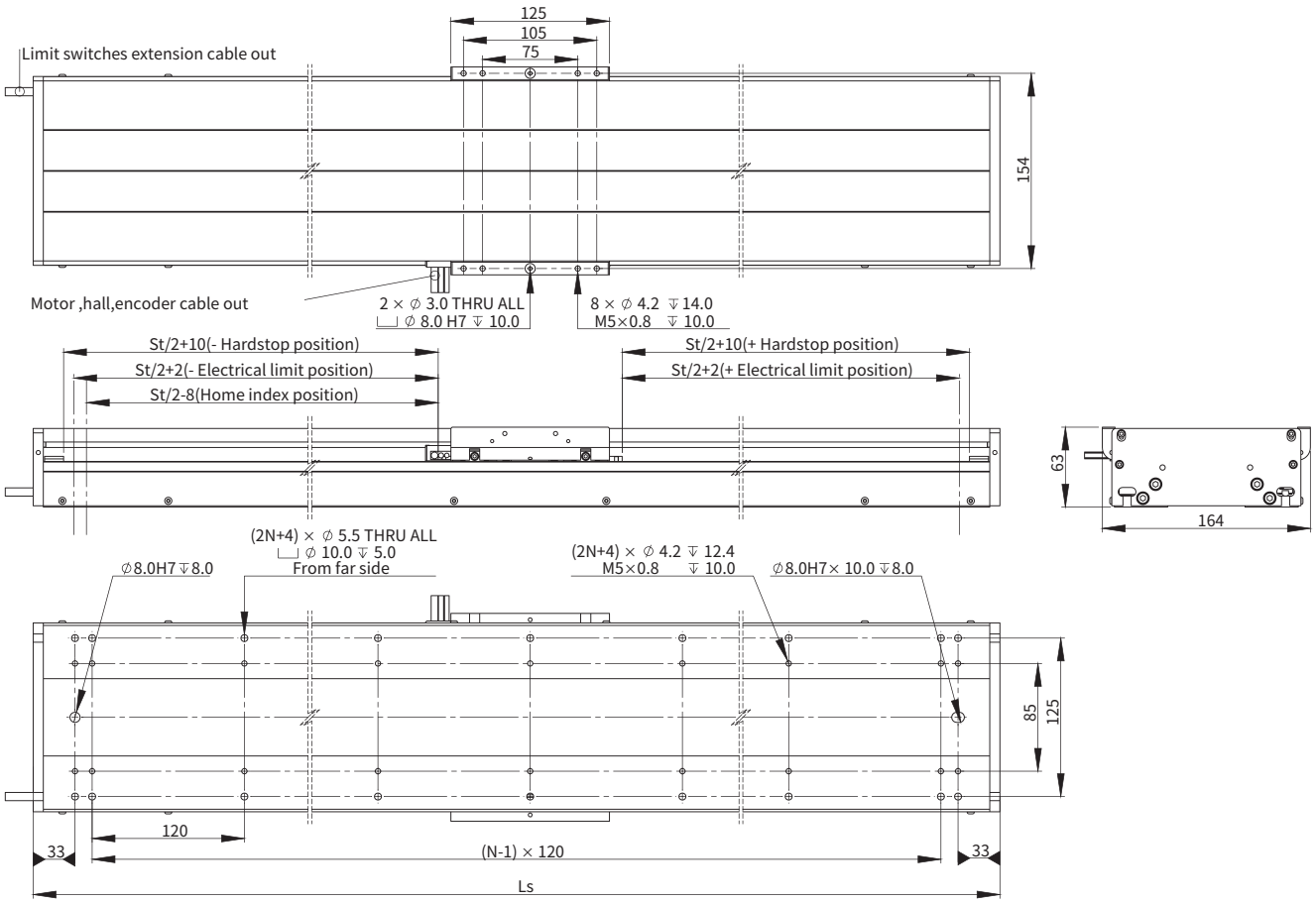


Force-Speed Curve



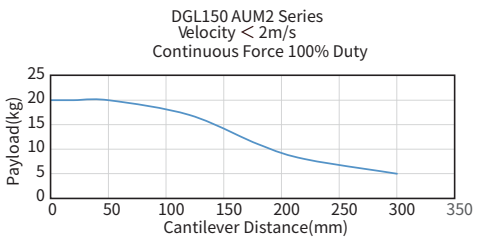
DGL150 Ironless Series

DGL150-AUM2-S4 Dimensional Drawing

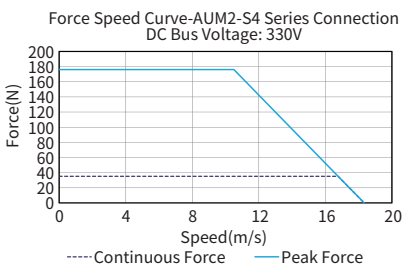


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	1	313	5.5
200	3	413	6.9
300	3	513	8.0
400	5	613	9.4
500	5	713	10.8
600	7	813	11.9
700	7	913	13.3
800	7	1013	14.7
900	9	1113	15.7
1000	9	1213	17.0
1100	11	1313	18.3
1200	11	1413	19.4

Cantilever-Payload Curve



Force-Speed Curve



Ordering Part Number (OPN)

DGL150 (Ironcore)

DGL150-S01-J01AD01-A1

Model:
DGL150

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Motor Type:
J01: AJM30-B2-J (Peak Force: 214.7N)
J02: AJM30-B2-K (Peak Force: 214.7N)
J03: AJM30-B4-J (Peak Force: 429.4N)
J04: AJM30-B4-K (Peak Force: 429.4N)

DGL150 (Ironless)

DGL150-S01-U06AD01-A1

Model:
DGL150

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Motor Type:
U06: AUM2-S-S4-K (Peak Force: 176.0N)

Note:
[1] Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers (cust-service@akribis-sys.com).
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

DGL180 Ironcore & Ironless Series

		DGL180 Ironcore Series		DGL180 Ironless Series	
Motor Specifications	**Unit**	**Value**			
Motor	-	AJM50-B2	AJM50-B4	AUM3-S2	AUM3-S4
Continuous Force (NC) @100℃ ❶	N	117.0	234.0	57.0	113.0
Peak Force	N	369.0	738.1	289.0	578.0
Force Constant ±10%	N/Arms	50.9	50.9	31.4	62.8
Back EMF Constant ±10%	Vpeak/(m/s)	41.5	41.5	25.6	51.3
Resistance (L-L) @25℃ ±10% ❷	Ω	6.0	3.1	9.41	18.70
Inductance (L-L) ±30% [AJM] ❸ Inductance (L-L) ±40% [AUM] ❹	mH	25.9	13.0	6.99	13.98
Continuous Current (NC) @100℃ ❶	Arms	2.3	4.6	1.8	1.8
Peak Current	Arms	9.0	18.0	9.2	9.2
Max. Bus Voltage	Vdc	600	600	330	330
Magnetic Period	mm	20	20	60	60
Mechanical specifications	**Unit**	**Value**			
Effective Stroke	mm	100-1200	100-1200	100-1200	100-1200
Resolution	μm	0.05/0.1			
Repeatability	μm	±1			
Horizontal Straightness	μm/mm	±2/100	±2/100	±2/100	±2/100
Vertical Straightness	μm/mm	±4/100	±4/100	±4/100	±4/100
No-load Moving Mass	kg	3.5	4.9	2.9	3.9
Maximum Bearing Load	N	3120			
Rated Payload	kg	20	30	40	50
Max. Static Moment	Nm	140	140	140	140

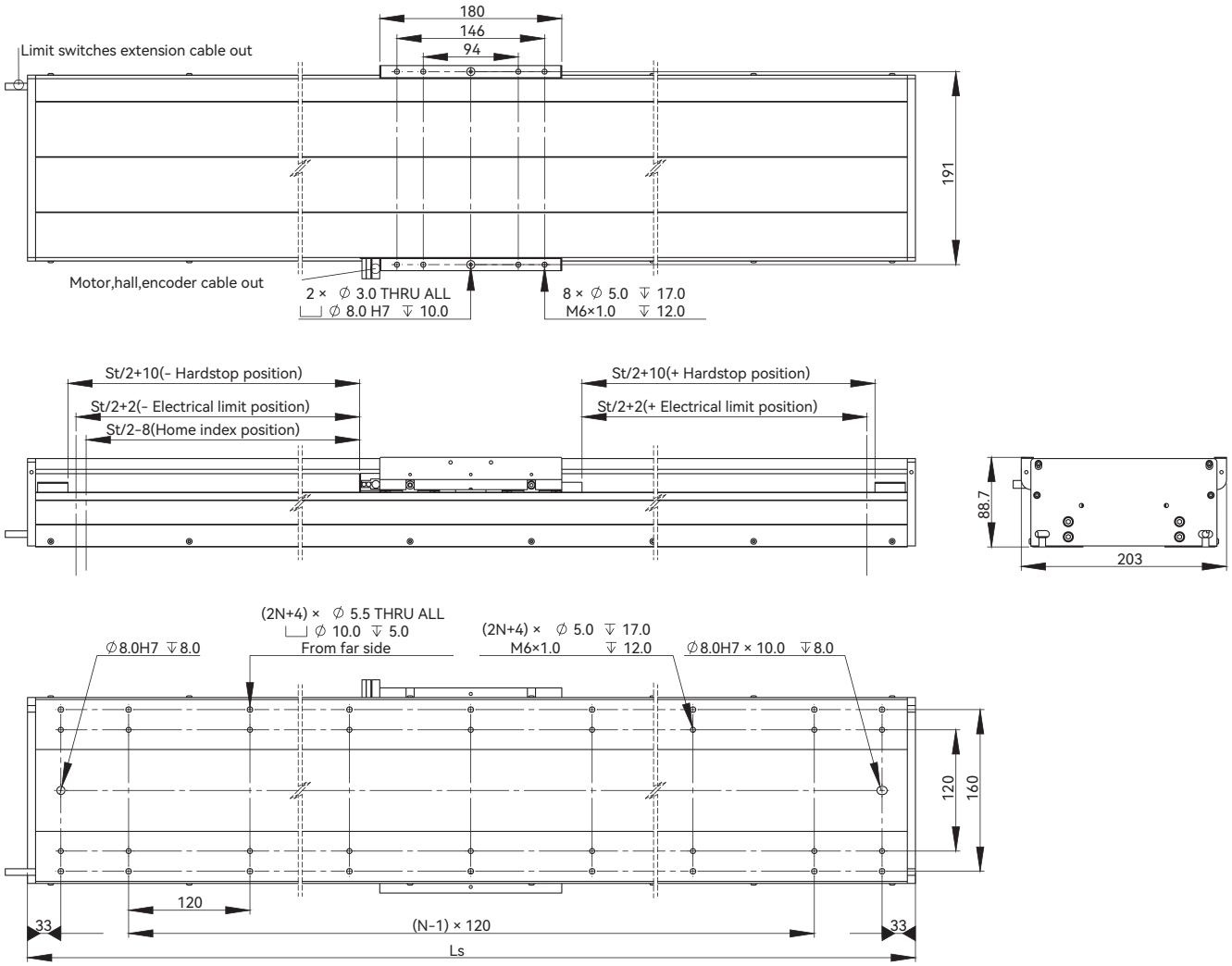
❶ Measurement is taken at ambient temperature 25℃. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
❹ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

- All values are measured based on module fully mounted on a 5μm granite table.
- Values are measured according to Akribis measurement standard.
- All specifications above are standard, contact Akribis for special request（cust-service@akribis-sys.com）.

The contents of datasheet are subject to change without prior notice.

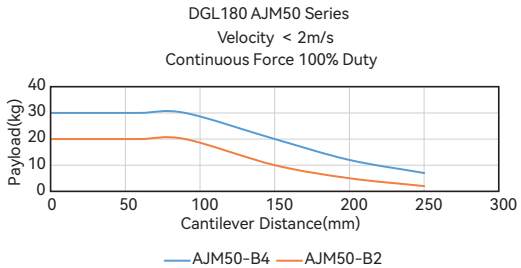
DGL180 Ironcore Series

DGL180-AJM50-B2 Dimensional Drawing

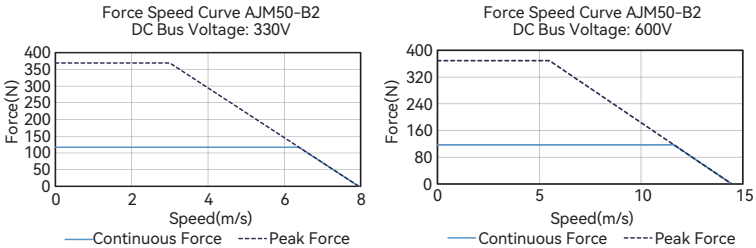


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	420	12.7
200	3	520	14.5
300	5	620	16.6
400	5	720	18.4
500	7	820	20.4
600	7	920	22.3
700	7	1020	24.3
800	9	1120	26.2
900	9	1220	28.3
1000	11	1320	30.1
1100	11	1420	32.3
1200	11	1520	33.9

Cantilever-Payload Curve

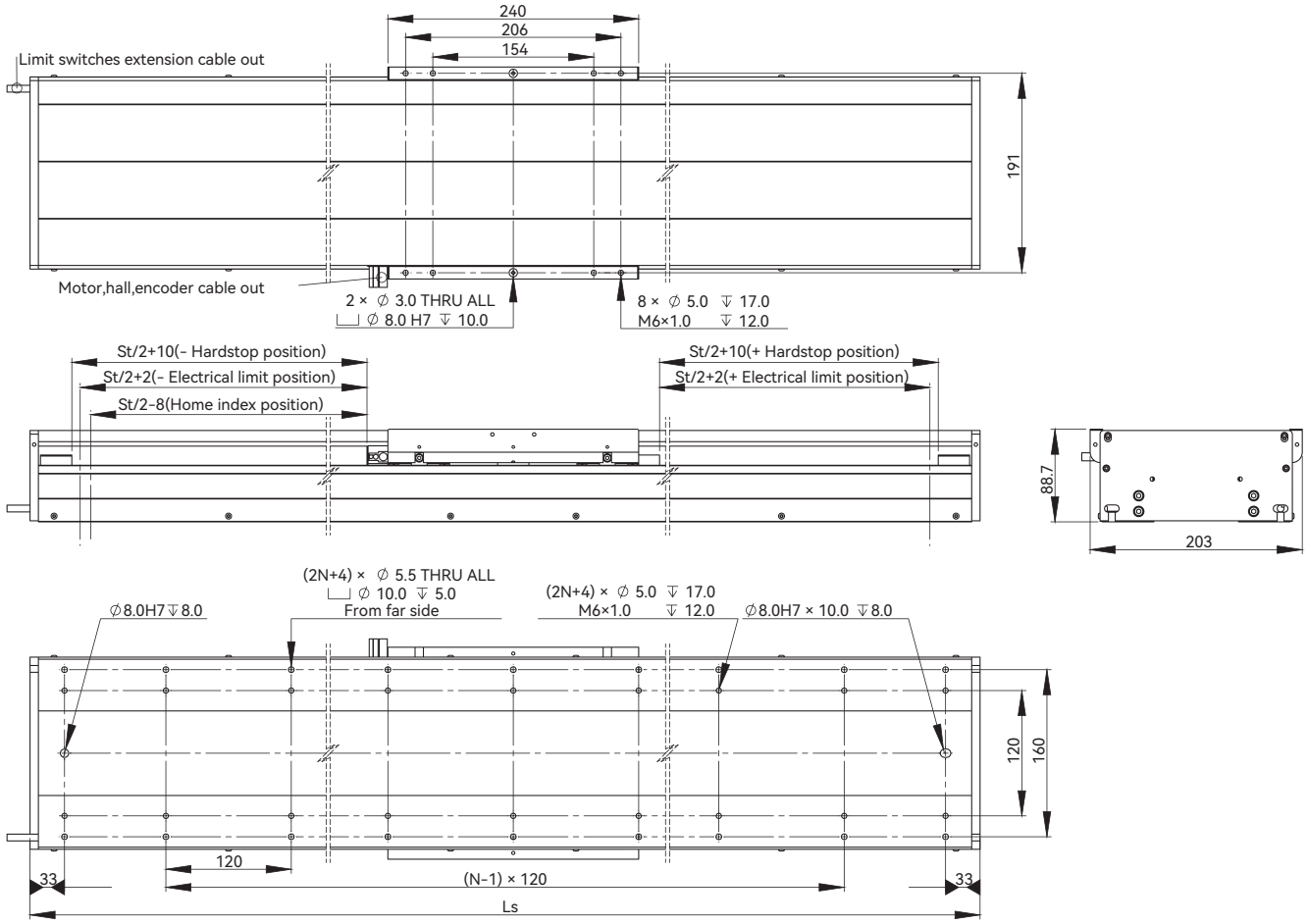


Force-Speed Curve



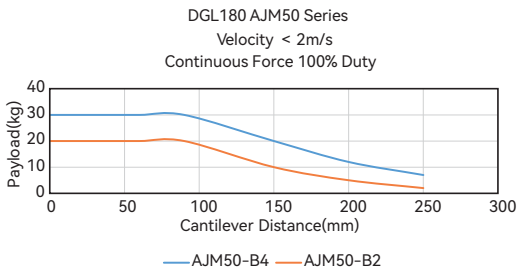
DGL180 Ironcore Series

DGL180-AJM50-B4 Dimensional Drawing

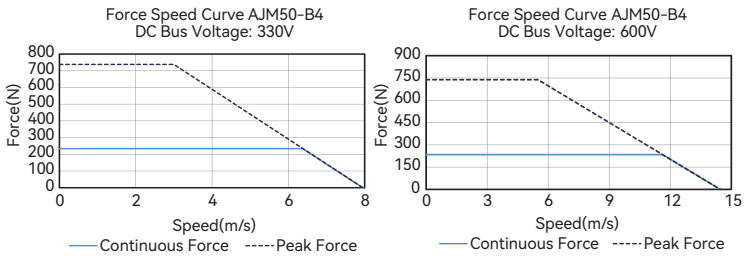


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	480	15.1
200	5	580	17.2
300	5	680	19.0
400	5	780	21.1
500	7	880	23.0
600	7	980	25.1
700	9	1080	26.7
800	9	1180	28.9
900	9	1280	30.8
1000	11	1380	32.7
1100	11	1480	34.6
1200	13	1580	36.7

Cantilever-Payload Curve

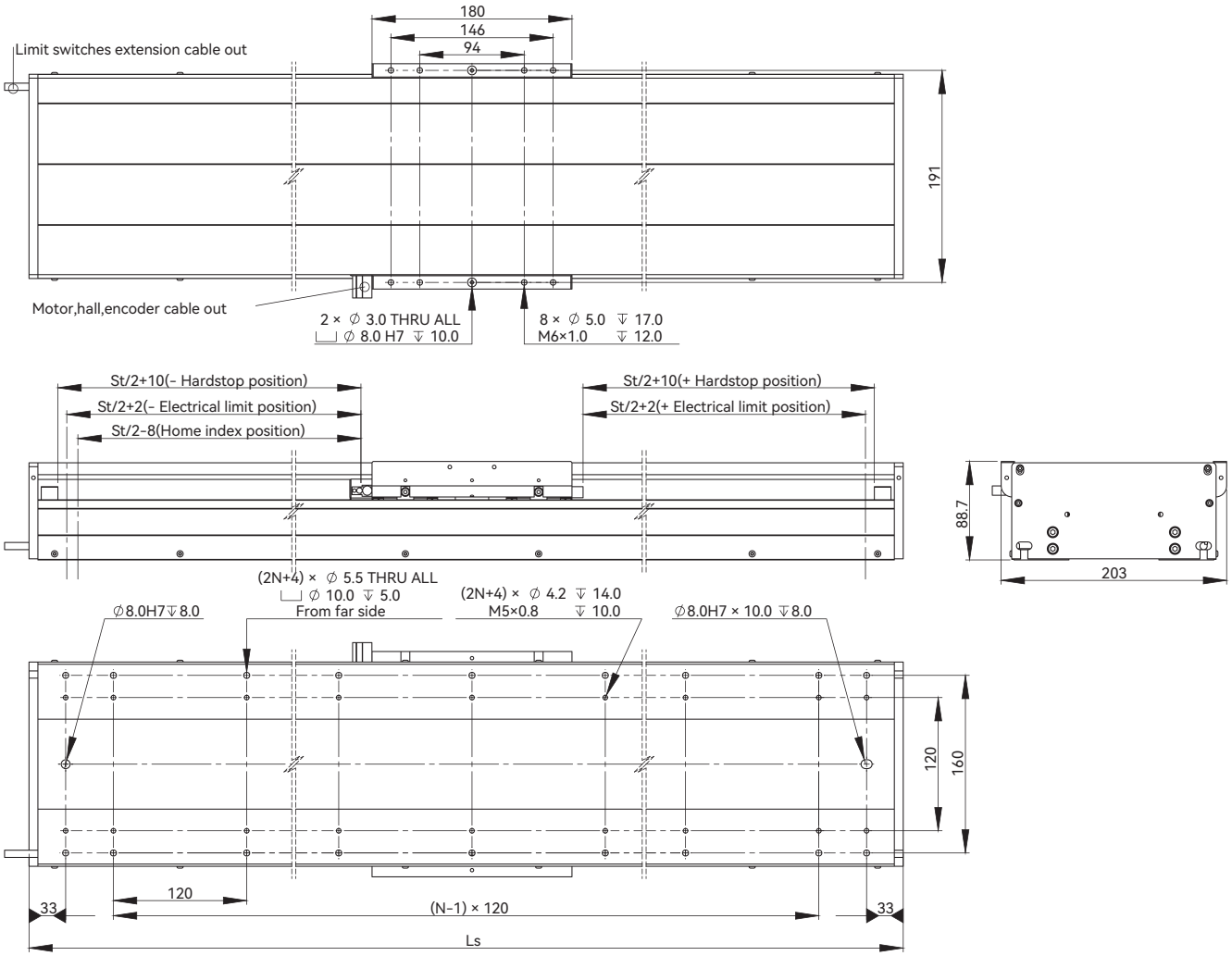


Force-Speed Curve



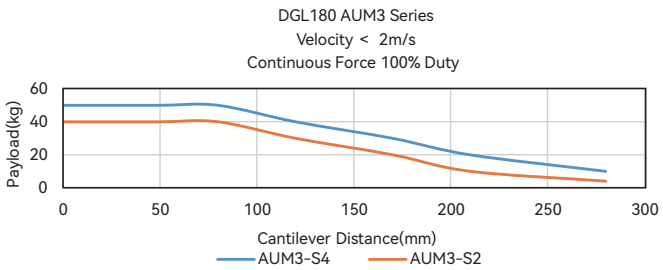
DGL180 Ironless Series

DGL180-AUM3-S2 Dimensional Drawing

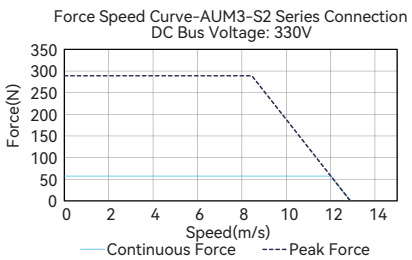


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	372	11.7
200	3	472	14.1
300	5	572	16.0
400	5	672	18.4
500	5	772	20.9
600	7	872	22.8
700	7	972	25.3
800	9	1072	27.8
900	9	1172	29.7
1000	9	1272	32.1
1100	11	1372	34.5
1200	11	1472	36.5

Cantilever-Payload Curve

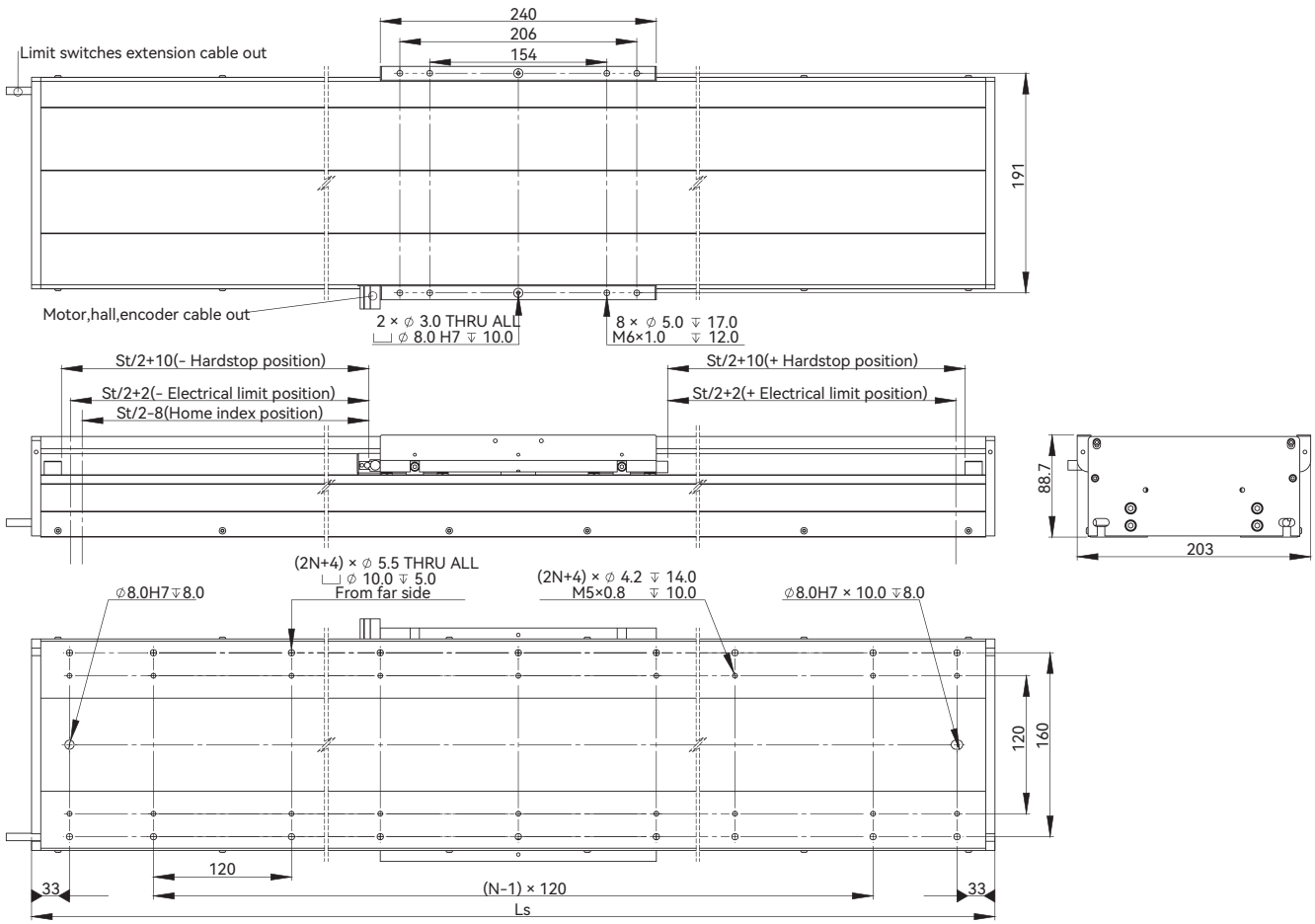


Force-Speed Curve



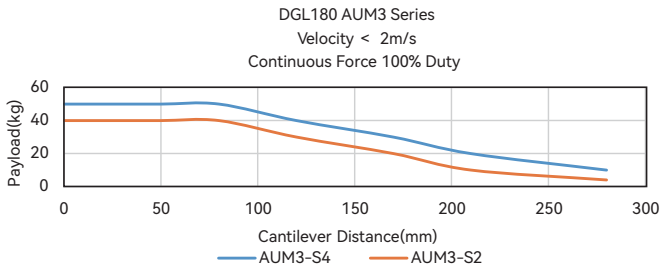
DGL180 Ironless Series

DGL180-AUM3-S4 Dimensional Drawing

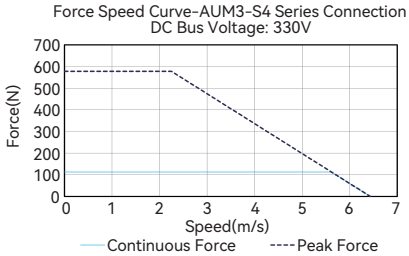


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	432	13.9
200	3	532	16.5
300	5	632	18.4
400	5	732	20.8
500	7	832	23.2
600	7	932	25.2
700	7	1032	27.6
800	9	1132	30.0
900	9	1232	32.1
1000	11	1332	34.5
1100	11	1432	36.9
1200	13	1532	38.9

Cantilever-Payload Curve



Force-Speed Curve



Ordering Part Number (OPN)

DGL180 (Ironcore)

DGL180-S01-J15AD01-A1

Model:
DGL180

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Motor Type:
J15: AJM50-B2-J (Peak Force: 369.0N)
J16: AJM50-B2-K (Peak Force: 369.0N)
J17: AJM50-B4-J (Peak Force: 738.1N)
J18: AJM50-B4-K (Peak Force: 738.1N)

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Scale Type:
1: Steel Tape, 11ppm/K

Cable Length:
A: 0.5m
B: 3.0m

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

DGL180 (Ironless)

DGL180-S01-U17AD01-A1

Model:
DGL180

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Motor Type:
U17: AUM3-S-S2-J (Peak Force: 289.0N)
U18: AUM3-S-S2-K (Peak Force: 289.0N)
U25: AUM3-S-S4-J (Peak Force: 578.0N)
U26: AUM3-S-S4-K (Peak Force: 578.0N)

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Scale Type:
1: Steel Tape, 11ppm/K

Cable Length:
A: 0.5m
B: 3.0m

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Note:
[1] Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers (cust-service@akribis-sys.com).
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

DGL200 Ironcore & Ironless Series

		DGL200 Ironcore Series		DGL200 Ironless Series	
Motor Specifications	**Unit**	**Value**			
Motor	-	AJM80-B2	AJM80-B4	AUM4-S2	AUM4-S4
Continuous Force (NC) @100℃ ❶	N	174.5	348.9	110.0	221.0
Peak Force	N	550.2	1100.4	624.0	1248.0
Force Constant ±10%	N/Arms	75.9	75.9	48.0	96.0
Back EMF Constant ±10%	Vpeak/(m/s)	61.9	61.9	39.2	78.4
Resistance (L-L) @25℃ ±10% ❷	Ω	8.4	4.2	9.33	18.62
Inductance (L-L) ±30% [AJM] ❸ Inductance (L-L) ±40% [AUM] ❹	mH	37.3	18.6	7.67	15.33
Continuous Current (NC) @100℃ ❶	Arms	2.3	4.6	2.3	2.3
Peak Current	Arms	9.0	18.0	13.0	13.0
Max. Bus Voltage	Vdc	600	600	330	330
Magnetic Period	mm	20	20	60	60
Mechanical specifications	**Unit**	**Value**			
Effective Stroke	mm	100-1200	100-1200	100-1200	100-1200
Resolution	μm	0.05/0.1			
Repeatability	μm	±1			
Horizontal Straightness	μm/mm	±2/100	±2/100	±2/100	±2/100
Vertical Straightness	μm/mm	±4/100	±4/100	±4/100	±4/100
No-load Moving Mass	kg	4.2	6.1	3.2	4.4
Maximum Bearing Load	N	3120			
Rated Payload	kg	20	30	60	70
Max. Static Moment	Nm	145	166	145	166

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
❹ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

- All values are measured based on module fully mounted on a 5μm granite table.
- Values are measured according to Akribis measurement standard.
- All specifications above are standard, contact Akribis for special request（cust-service@akribis-sys.com）.

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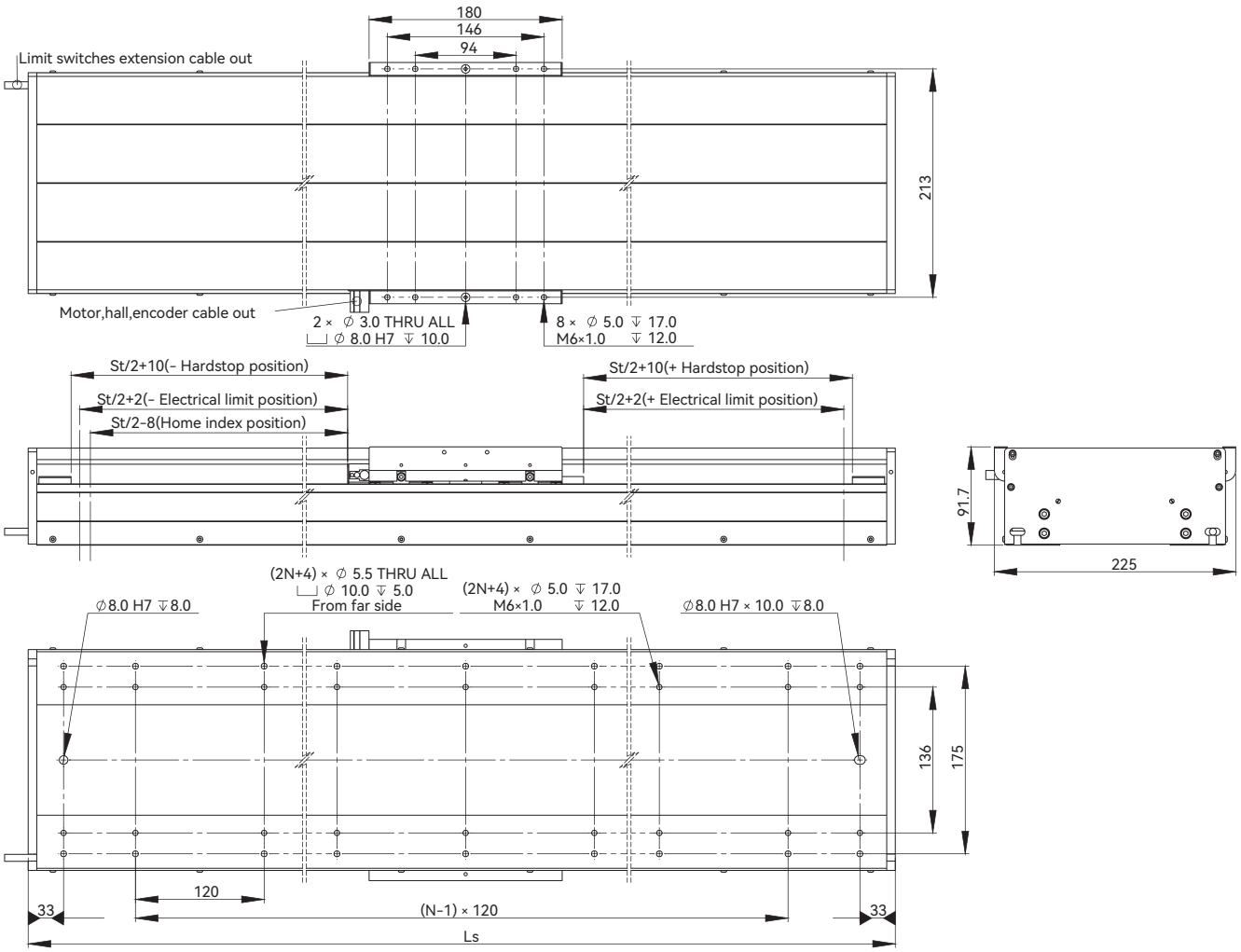
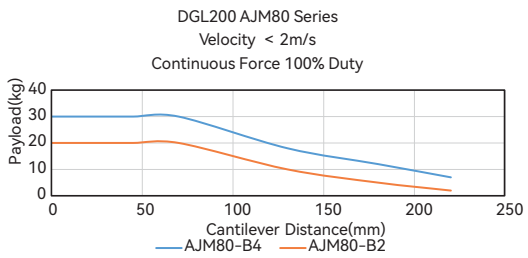
DGL200 Ironcore Series

DGL200-AJM80-B2 Dimensional Drawing

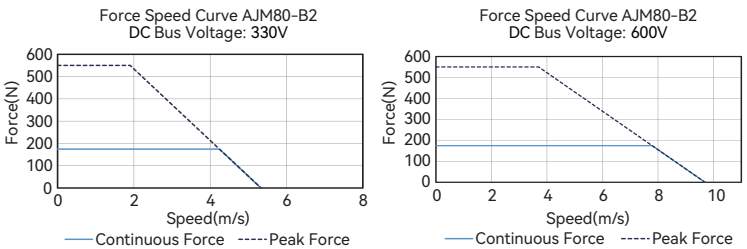


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	420	14.7
200	3	520	16.9
300	5	620	19.3
400	5	720	21.5
500	7	820	23.9
600	7	920	26.1
700	7	1020	28.5
800	9	1120	30.5
900	9	1220	33.1
1000	11	1320	35.2
1100	11	1420	37.6
1200	11	1520	39.8

Cantilever-Payload Curve

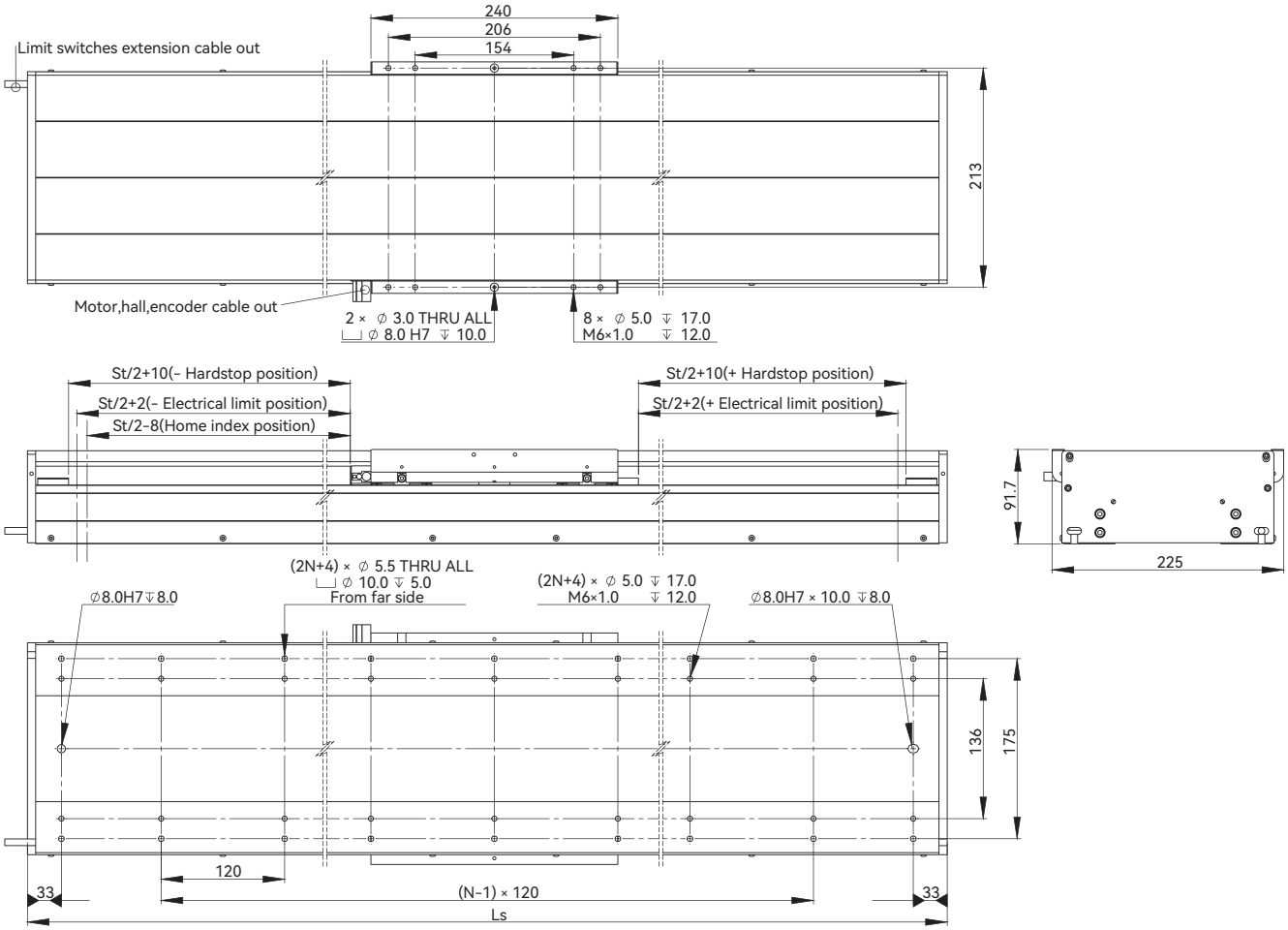


Force-Speed Curve



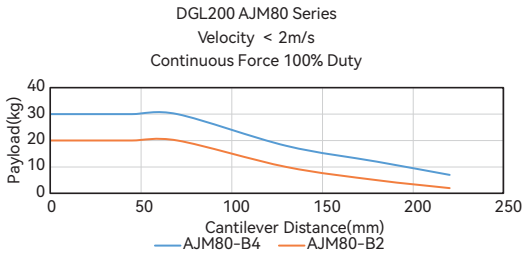
DGL200 Ironcore Series

DGL200-AJM80-B4 Dimensional Drawing

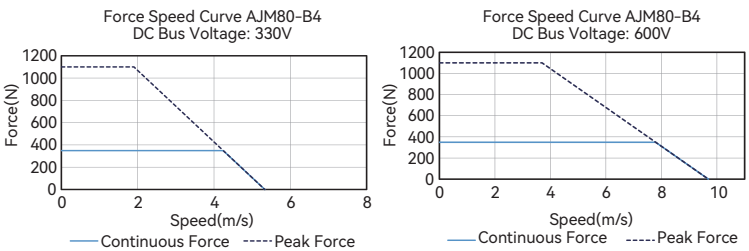


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	480	17.8
200	5	580	20.1
300	5	680	22.4
400	5	780	24.8
500	7	880	26.8
600	7	980	29.4
700	9	1080	31.5
800	9	1180	33.8
900	9	1280	36.1
1000	11	1380	38.5
1100	11	1480	40.7
1200	13	1580	43.1

Cantilever-Payload Curve

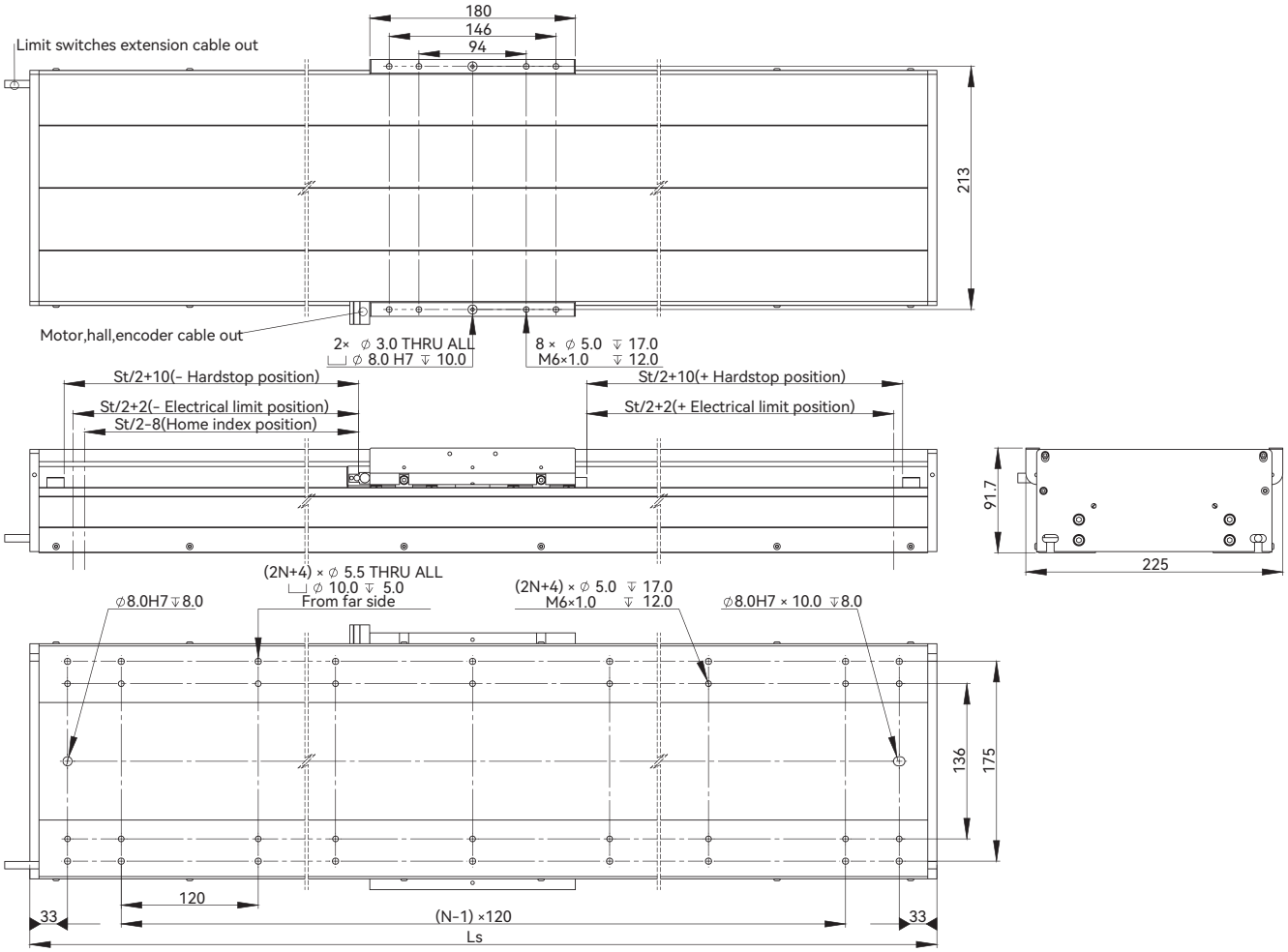


Force-Speed Curve



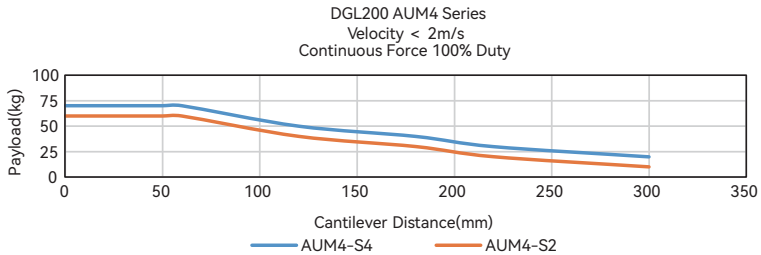
DGL200 Ironless Series

DGL200-AUM4-S2 Dimensional Drawing

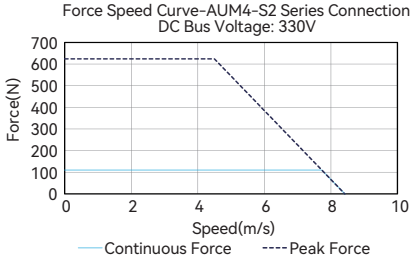


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	380	14.6
200	3	480	18.0
300	5	580	20.4
400	5	680	23.8
500	5	780	27.2
600	7	880	29.6
700	7	980	33.0
800	9	1080	36.4
900	9	1180	38.9
1000	9	1280	42.2
1100	11	1380	45.6
1200	11	1480	48.1

Cantilever-Payload Curve

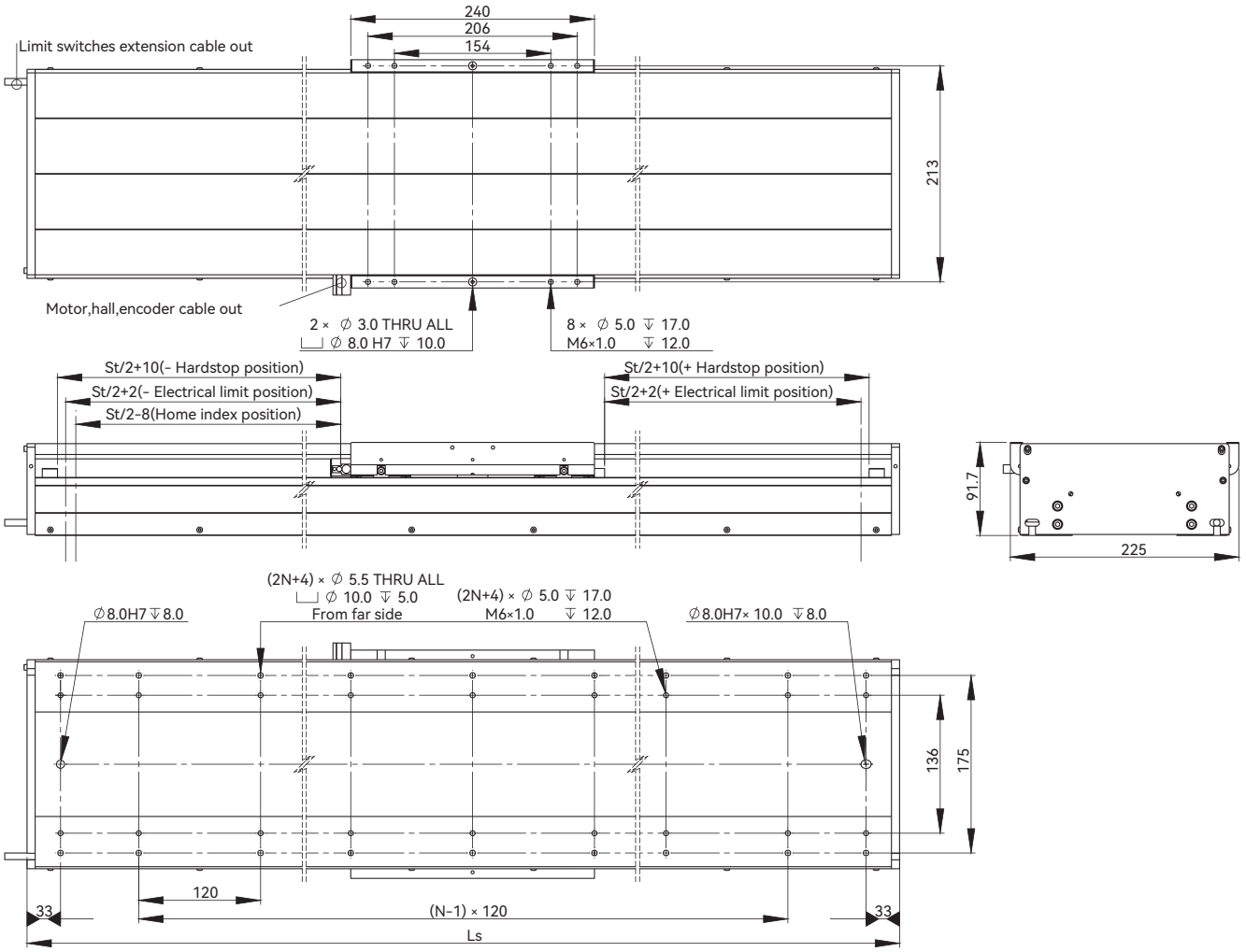


Force-Speed Curve



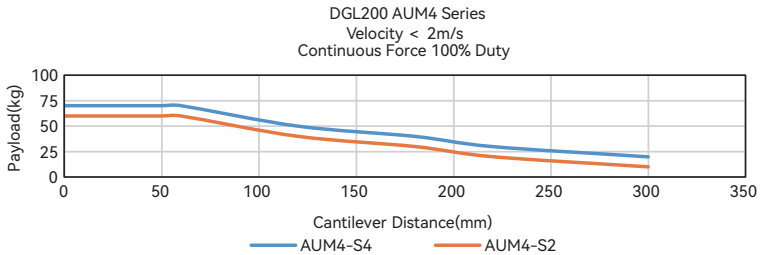
DGL200 Ironless Series

DGL200-AUM4-S4 Dimensional Drawing

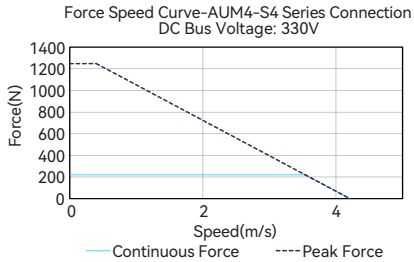


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	440	17.6
200	3	540	21.0
300	5	640	23.5
400	5	740	26.9
500	7	840	30.2
600	7	940	32.7
700	7	1040	36.1
800	9	1140	39.4
900	9	1240	41.9
1000	11	1340	45.2
1100	11	1440	48.6
1200	13	1540	51.1

Cantilever-Payload Curve



Force-Speed Curve



Ordering Part Number (OPN)

DGL200 (Ironcore)

DGL200-S01-J30AD01-A1

Model:
DGL200

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Motor Type:
J30: AJM80-B2-J (Peak Force: 550.2N)
J31: AJM80-B2-K (Peak Force: 550.2N)
J32: AJM80-B4-J (Peak Force: 1100.4N)
J33: AJM80-B4-K (Peak Force: 1100.4N)

DGL200 (Ironless)

DGL200-S01-U42AD01-A1

Model:
DGL200

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Motor Type:
U42: AUM4-S-S2-J (Peak Force: 624.0N)
U43: AUM4-S-S2-K (Peak Force: 624.0N)
U50: AUM4-S-S4-J (Peak Force: 1248.0N)
U51: AUM4-S-S4-K (Peak Force: 1248.0N)

Note:
[1] Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers (cust-service@akribis-sys.com).
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

DGL260 Ironcore & Ironless Series

		DGL260 Ironcore Series		DGL260 Ironless Series	
Motor Specifications	**Unit**	**Value**			
Motor	-	AJM100-B2	AJM100-B4	AUM5-S2	AUM5-S4
Continuous Force (NC) @100℃ ❶	N	223.4	446.8	197.0	393.0
Peak Force	N	704.5	1409.1	1415.0	2830.0
Force Constant ±10%	N/Arms	97.1	97.1	78.6	157.2
Back EMF Constant ±10%	Vpeak/(m/s)	79.3	79.3	64.2	128.4
Resistance (L-L) @25℃ ±10% ❷	Ω	10.3	5.2	8.28	16.52
Inductance (L-L) ±30% [AJM] ❸ Inductance (L-L) ±40% [AUM] ❹	mH	47.2	23.6	13.00	26.00
Continuous Current (NC) @100℃ ❶	Arms	2.3	4.6	2.5	2.5
Peak Current	Arms	9.0	18.0	18.0	18.0
Max. Bus Voltage	Vdc	600	600	330	330
Magnetic Period	mm	20	20	84	84
Mechanical specifications	**Unit**	**Value**			
Effective Stroke	mm	100-1200	100-1200	100-1200	100-1200
Resolution	μm	0.05/0.1			
Repeatability	μm	±1			
Horizontal Straightness	μm/mm	±2/100	±2/100	±2/100	±2/100
Vertical Straightness	μm/mm	±4/100	±4/100	±4/100	±4/100
No-load Moving Mass	kg	6.1	8.6	6.6	9.9
Maximum Bearing Load	N	4050			
Rated Payload	kg	50	70	120	140
Max. Static Moment	Nm	145	218	218	310

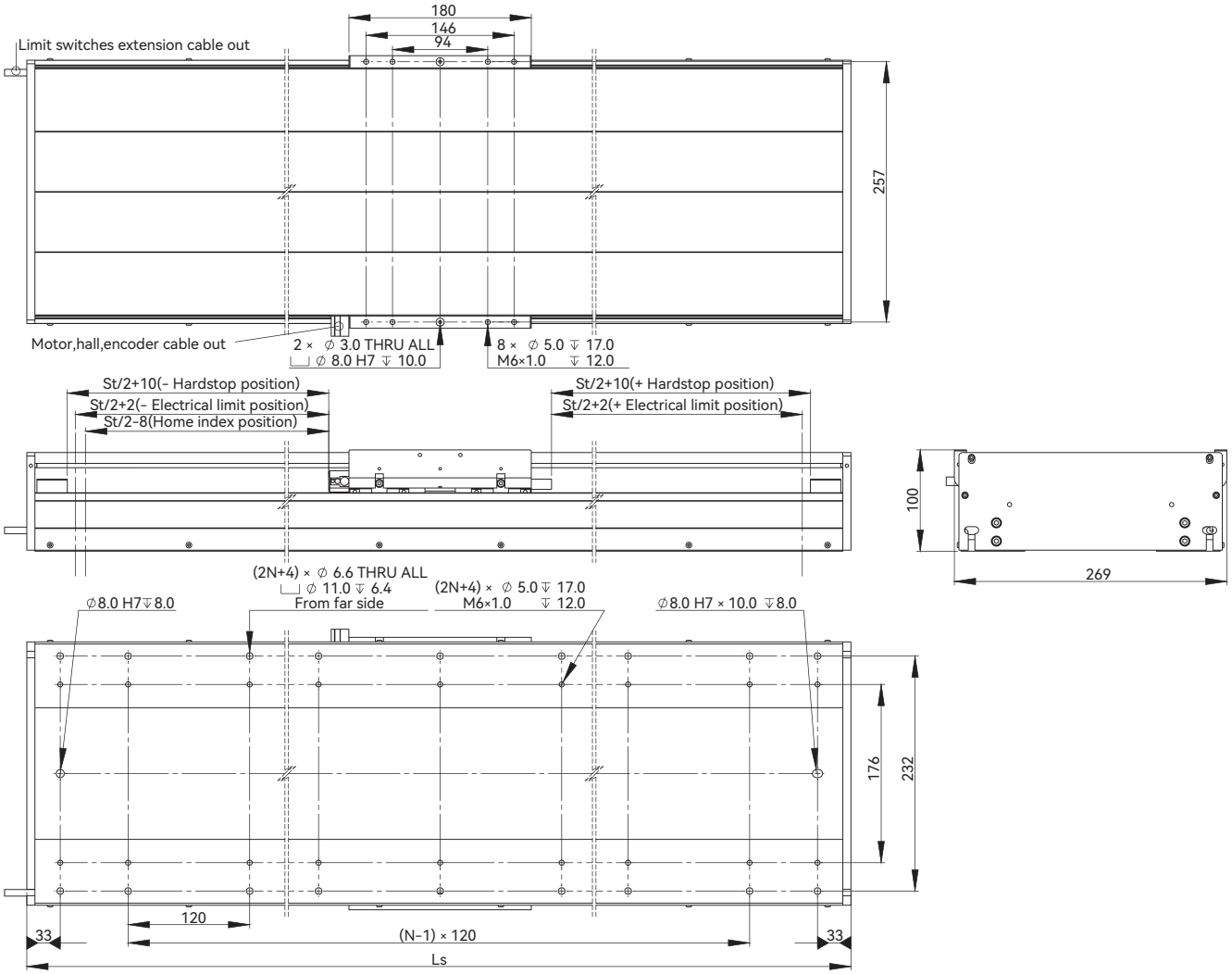
❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
❹ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

- All values are measured based on module fully mounted on a 5μm granite table.
- Values are measured according to Akribis measurement standard.
- All specifications above are standard, contact Akribis for special request（cust-service@akribis-sys.com）.

The contents of datasheet are subject to change without prior notice.

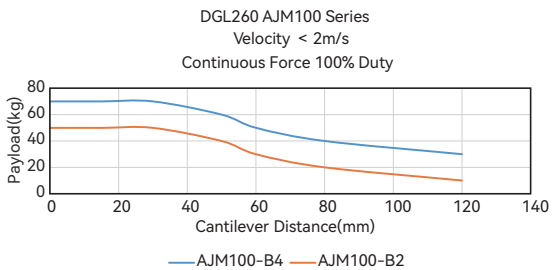
DGL200 Ironcore Series

DGL260-AJM100-B2 Dimensional Drawing

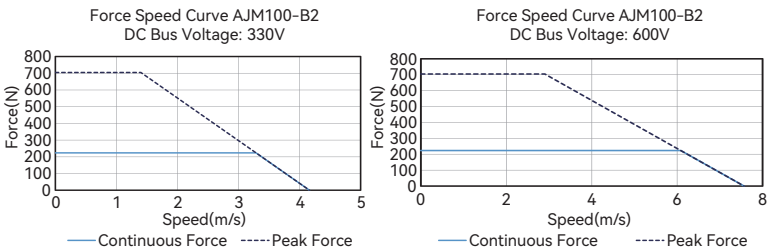


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	420	19.7
200	3	520	22.8
300	5	620	26.1
400	5	720	29.2
500	7	820	32.5
600	7	920	35.7
700	7	1020	39.1
800	9	1120	42.0
900	9	1220	45.5
1000	11	1320	48.5
1100	11	1420	51.9
1200	11	1520	55.0

Cantilever-Payload Curve

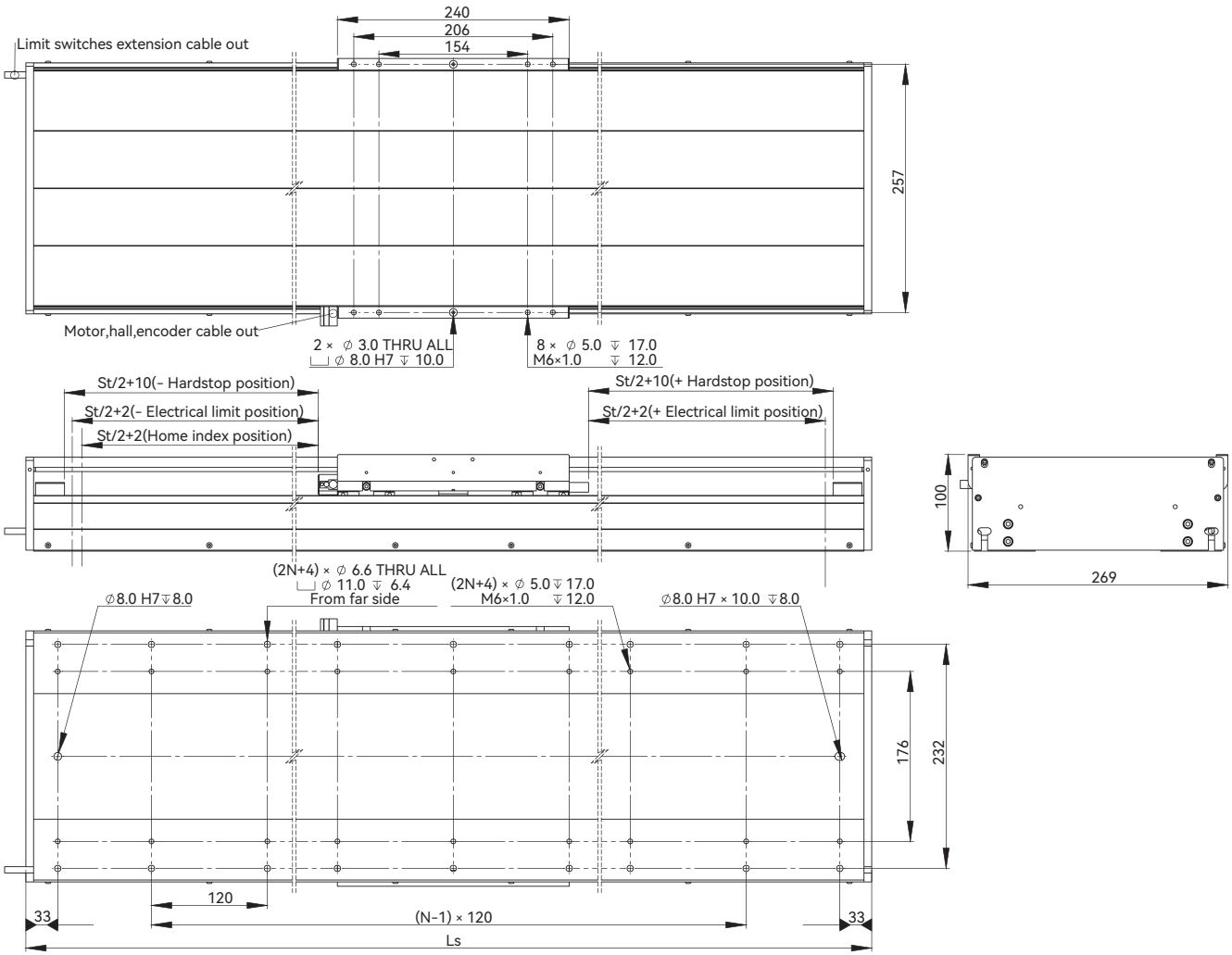


Force-Speed Curve



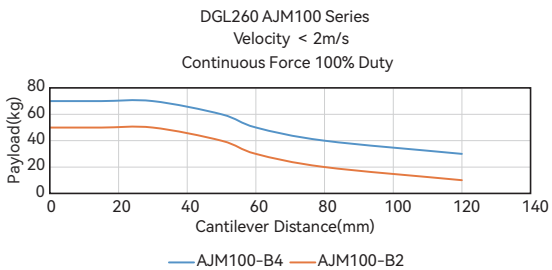
DGL200 Ironcore Series

DGL260-AJM100-B4 Dimensional Drawing

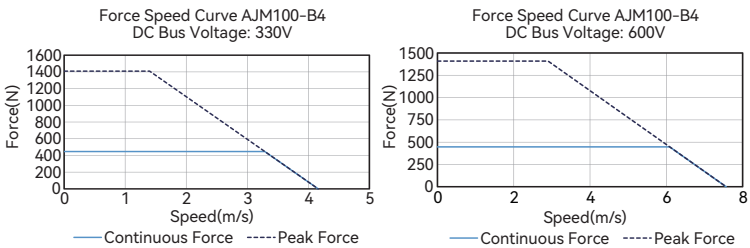


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	480	23.8
200	5	580	27.3
300	5	680	30.2
400	5	780	33.6
500	7	880	36.7
600	7	980	40.1
700	9	1080	43.2
800	9	1180	46.5
900	9	1280	49.6
1000	11	1380	53.0
1100	11	1480	56.1
1200	13	1580	59.4

Cantilever-Payload Curve

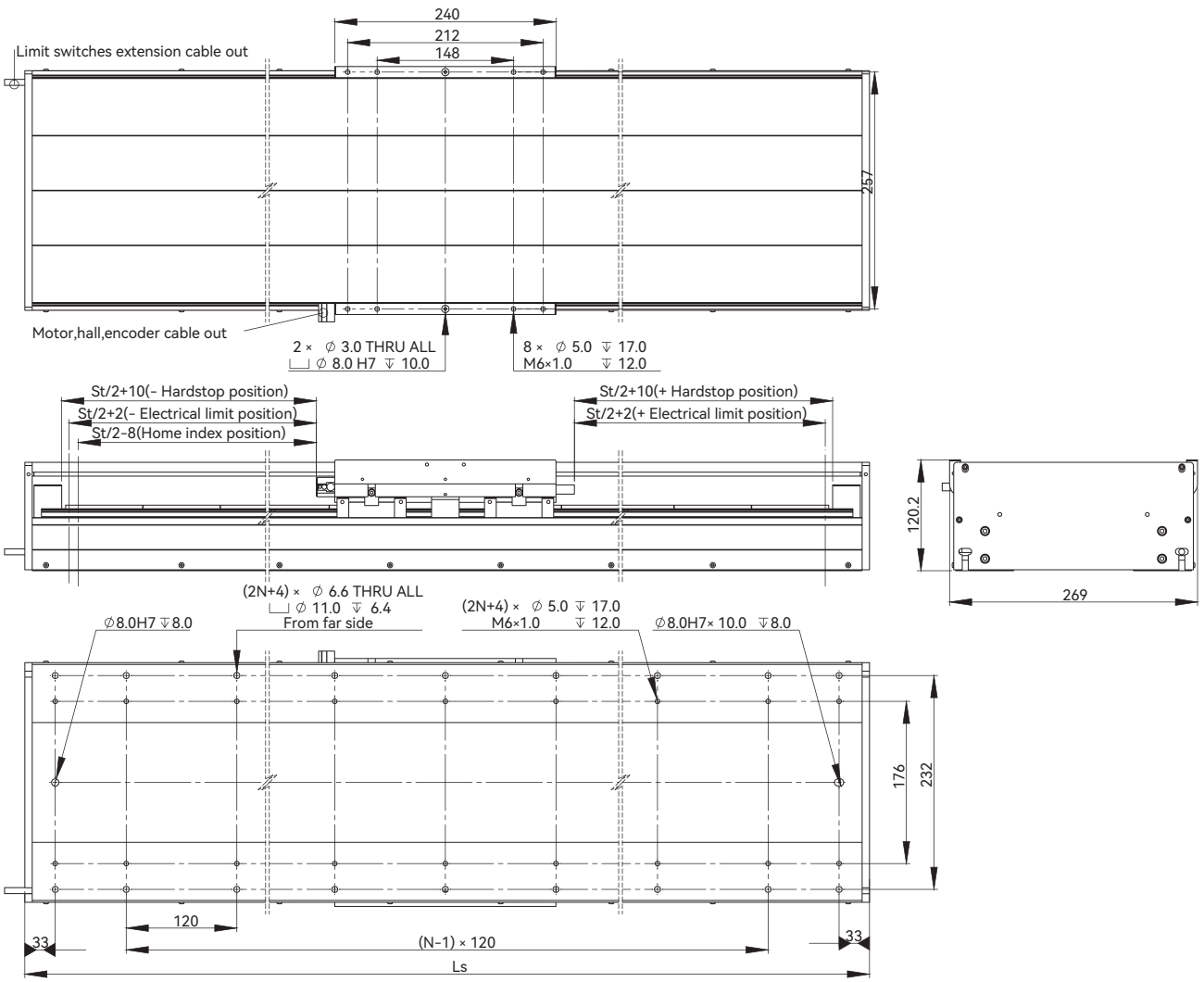


Force-Speed Curve



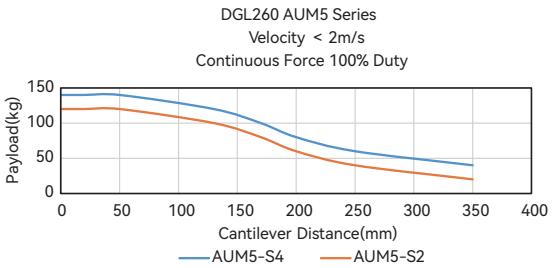
DGL200 Ironless Series

DGL260-AUM5-S2 Dimensional Drawing

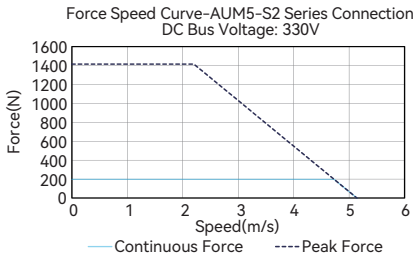


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	3	480	30.4
200	5	580	35.3
300	5	680	42.3
400	5	780	47.2
500	7	880	52.0
600	7	980	56.8
700	9	1080	61.7
800	9	1180	68.8
900	9	1280	73.6
1000	11	1380	78.5
1100	11	1480	83.3
1200	13	1580	88.2

Cantilever-Payload Curve

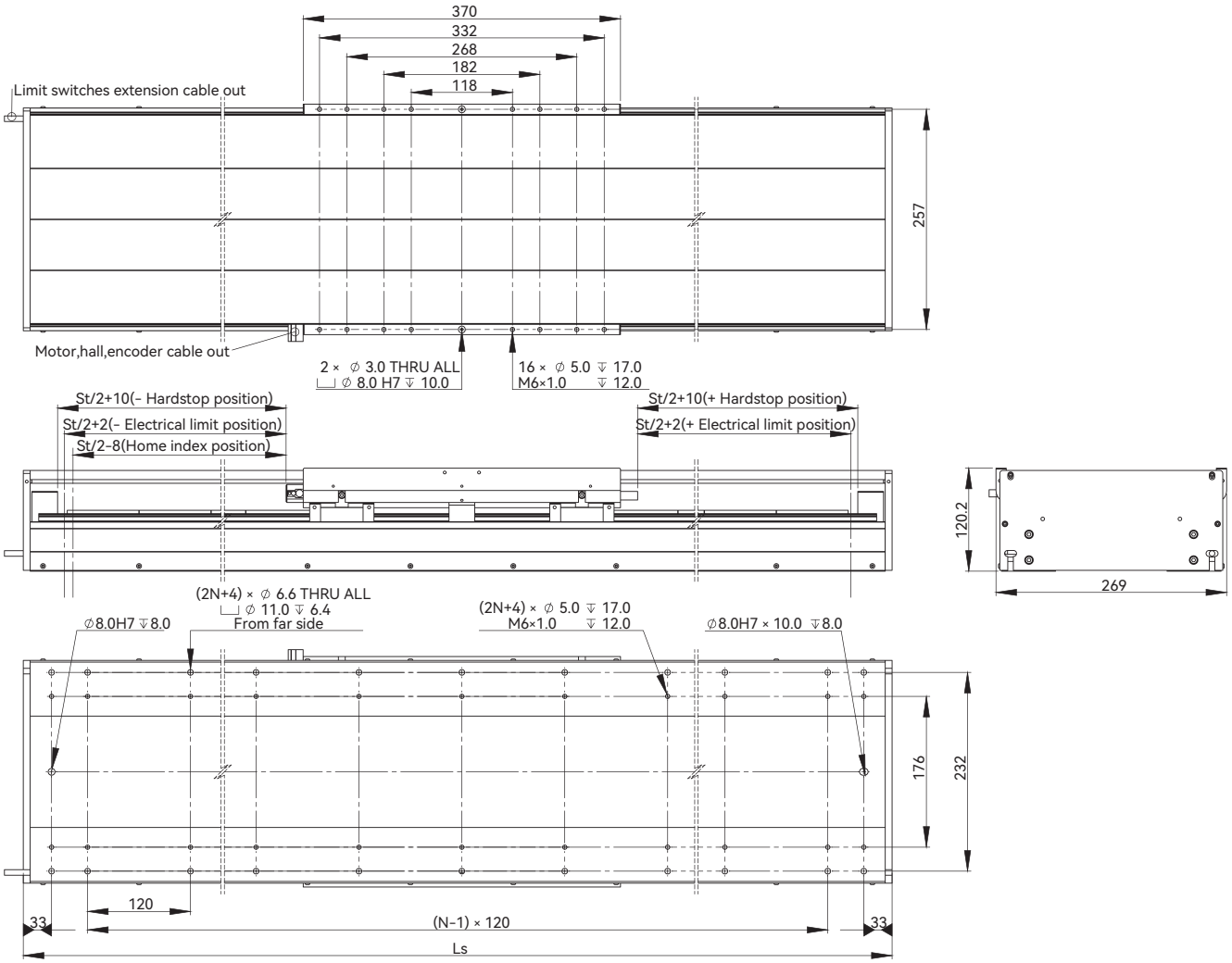


Force-Speed Curve



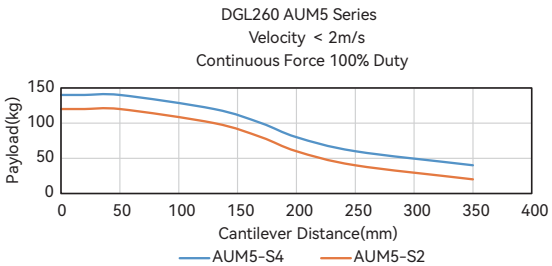
DGL260 Ironless Series

DGL260-AUM5-S4 Dimensional Drawing

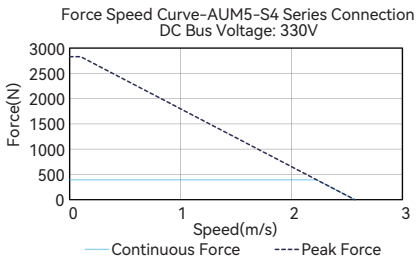


Effective Stroke(mm)	N	Module Length, Ls (mm)	Module Mass (kg)
100	5	610	41.5
200	5	710	46.3
300	5	810	51.3
400	7	910	56.1
500	7	1010	63.2
600	9	1110	68.0
700	9	1210	72.9
800	11	1310	77.8
900	11	1410	84.7
1000	11	1510	89.6
1100	13	1610	94.4
1200	13	1710	99.3

Cantilever-Payload Curve



Force-Speed Curve



Ordering Part Number (OPN)

DGL260 (Ironcore)

DGL260-S01-J45AD01-A1

Model:
DGL260

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Motor Type:
J45: AJM100-B2-J (Peak Force: 704.5N)
J46: AJM100-B2-K (Peak Force: 704.5N)
J47: AJM100-B4-J (Peak Force: 1409.1N)
J48: AJM100-B4-K (Peak Force: 1409.1N)

DGL260 (Ironless)

DGL260-S01-U72AD01-A1

Model:
DGL260

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)

Effective Stroke:[1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

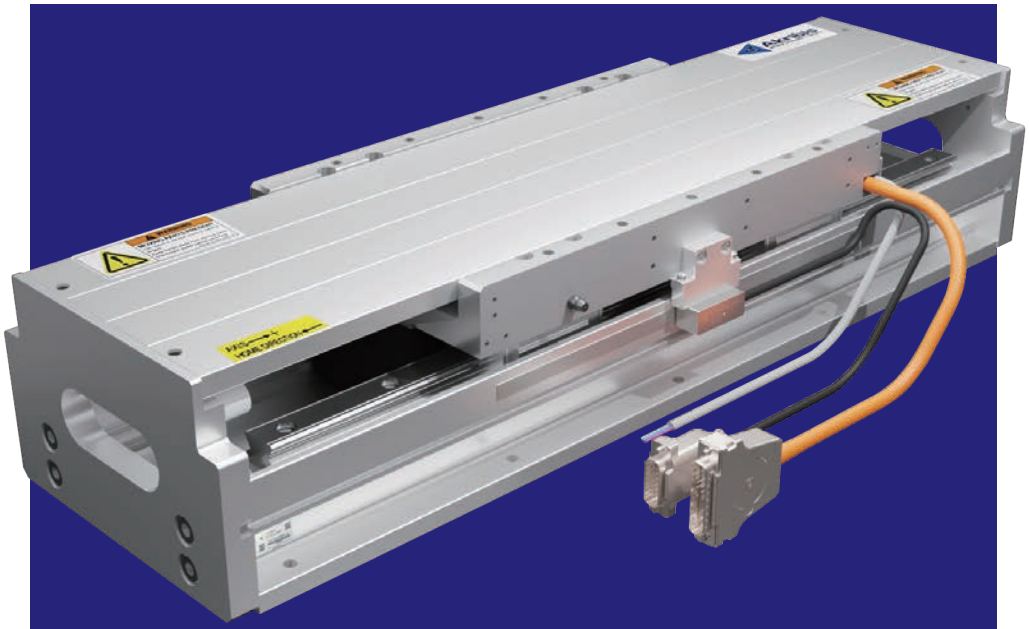
Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A70: ABA-50, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABH: ABI-51X, TTL (0.1μm)
R2H: Quantic, TTL (0.1μm)

Motor Type:
U72: AUM5-S-S2-J (Peak Force: 1415.0N)
U73: AUM5-S-S2-K (Peak Force: 1415.0N)
U80: AUM5-S-S4-J (Peak Force: 2830.0N)
U81: AUM5-S-S4-K (Peak Force: 2830.0N)

Note:
[1] Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers (cust-service@akribis-sys.com).
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.



DGC SERIES

- Linear motor positioning system
- Short lead time
- High price-performance ratio
- Easy installation

EN-25.5.1

Introduction

Akribis' DGC series are compact linear motor positioning modules with dual linear guides and aluminum base.

Four sizes are available: DGC90, DGC130B, DGC175B and DGC235.

The DGC series are powered by AQM and AKM series iron-cored linear motors. The AQM motors are economical linear motors with a excellent price-performance ratio while the AKM motors maximize force density to satisfy aggressive positioning requirements.

The DGC series is optimally suited for rapid point-to-point rapid positioning applications requiring micron-level position repeatability.

Continuous Force F_{cn} = 60.8N~1445.3N
Peak Force F_{pk} = 149.2N~3221.1N

Features

- Economical dual guide linear motor stage
- Built-in flat type linear motors with iron core
- Stroke from 100mm to 1400mm, customizable
- Optional resolution of 0.05μm, 0.5μm or 1μm
- A variety of absolute and incremental feedback options available
- Aluminium profile base, fewer parts, economical configuration

Applications

Suitable for point to point micron level fast positioning, can meet 3m/s or even higher speed, accept customization.

For example: electronic semiconductors, photovoltaic and lithium batteries, glass and LCD panels, medical equipments, industrial printing machines, laser processing, precision assembly and other equipment and production lines, where high speed and high precision positioning is required for handling situations.

Dual Guide Modules Series	Linear Motor Series		Continuous Force (F_{cn}) ■ Peak Force (F_{pk}) Unit: N (100 / 300 / 500 / 1000 / 3000 / 5000)	Stroke (mm) ❶	Repeatability (μm)	Page
 DGC90	 AQM24	AQM24-B1	60.8 / 149.2	100 ~ 800	Optical scale up to ±2 Magnetic scale up to ±4	63
 DGC130B	 AKM30	AKM30-B1	108.4 / 241.6	100 ~ 1200		65
		AKM30-B2	216.8 / 483.2			66
		AKM30-B4	433.6 / 966.3			67
 DGC175B	 AKM50	AKM50-B1	180.7 / 402.6	100 ~ 1400		69
		AKM50-B2	361.3 / 805.3			70
		AKM50-B3-D67	542.0 / 1208.0			71
		AKM50-B4	722.6 / 1610.5			72
 DGC235	 AKM100	AKM100-B2	722.6 / 1610.5	100 ~ 1400		74
		AKM100-B3-D69	1084.0 / 2416.0			75
		AKM100-B4	1445.3 / 3221.1			76

Note:
❶ Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

DGC90 Series

Motor Specifications	Unit	Value
Motor	-	AQM24-B1
Continuous Force (NC) @100℃ ❶	N	60.8
Peak Force	N	149.2
Force Constant ±10%	N/Arms	24.3
Back EMF Constant ±10%	Vpeak/(m/s)	19.8
Resistance (L-L) @25℃ ±10% ❷	Ω	5.1
Inductance (L-L) ±40% ❸	mH	39.1
Continuous Current (NC) @100℃ ❶	Arms	2.5
Peak Current	Arms	9.0
Max. Bus Voltage	Vdc	600
Magnetic Period	mm	30
Mechanical Specifications	**Unit**	**Value**
Linear Guide Nominal Size	-	12
Resolution	μm	Magnetic scale: 1.0
		Optical scale: 0.5/0.05
Repeatability	μm	Magnetic scale: ±4
		Optical scale: ±2
Straightness	μm/mm	±7/300
Maximum Velocity	m/s	1.5
Maximum Bearing Load	N	640
Rated Payload ❹	kg	7
No-load Moving Mass	kg	1.7
Mounting Orientation	-	Horizontal or side orientation

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
❹ Rated payload based on 1.5m/s velocity and continuous force 100% duty. Module load capacity can be better based on actual condition, please contact sales engineer.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

DGC90-S01-Q10A731-A1

Model:
DGC90

Cover Type:
S: Standard (Clear Anodized)

Effective Stroke: ❶
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K
7: Magnetic Tape, 17ppm/K

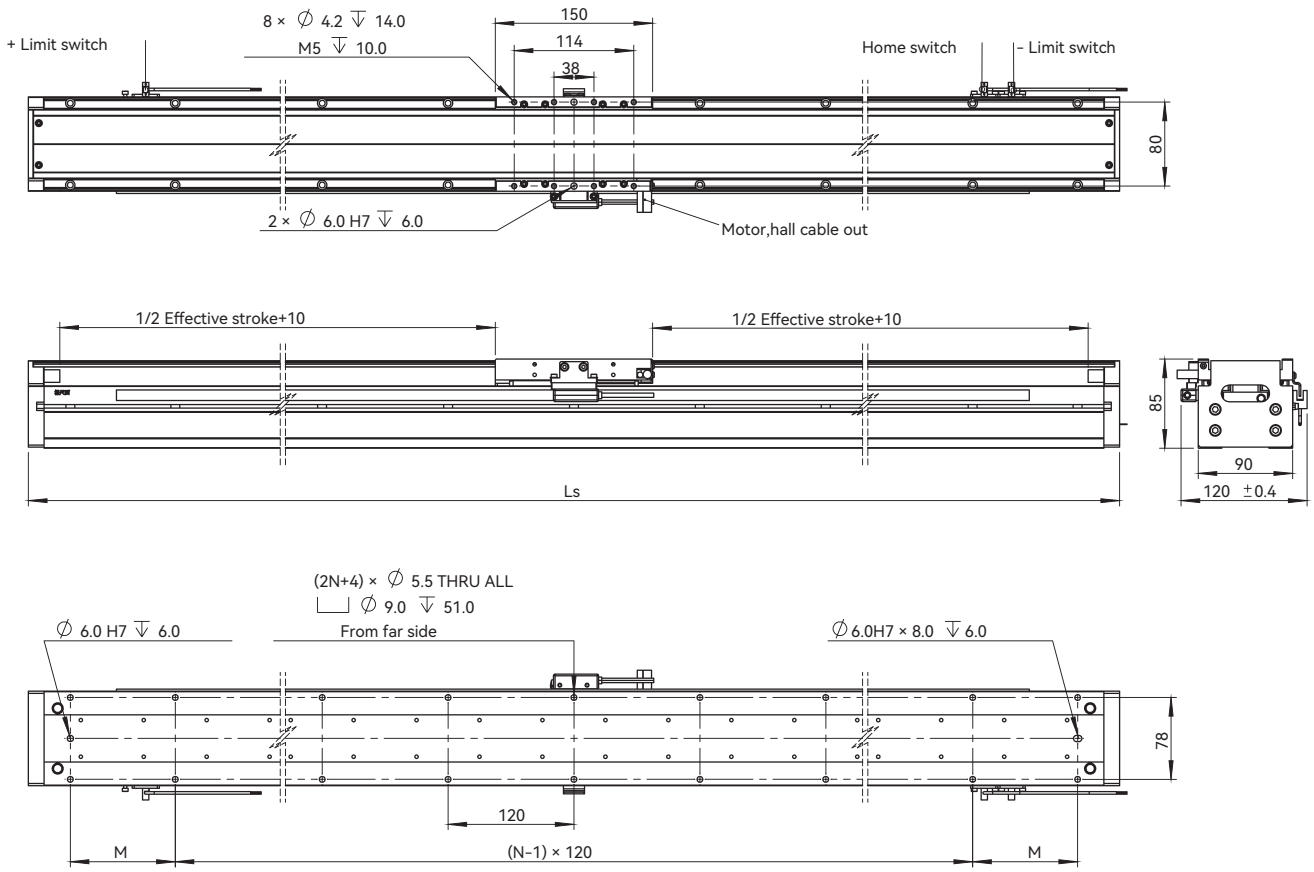
Encoder Type:
A73: ABA-50, EnDat 2.2 (50nm)
A0F: ABI-21 (0.5μm)
S1E: MAGNET (1.0μm)

Motor Type:
Q10: AQM24-B1-J (Peak Force: 149.2N)

Note:
❶ Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers.
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

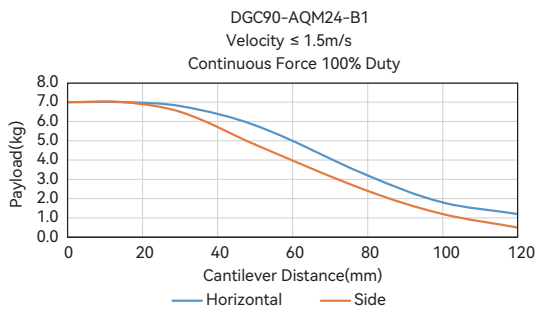
DGC90 Series

DGC90-AQM24-B1 Dimensional Drawing



Effective Stroke(mm)	Module Length, Ls (mm)	N	M (mm)	Module Mass (kg)
100	340	1	130	6.5
200	430	3	55	7.5
300	530	3	105	8.5
400	640	5	40	9.5
500	730	5	85	10.5
600	830	7	15	11.5
700	930	7	65	12.5
800	1030	7	115	13.5

Cantilever-Payload Curve



DGC130B Series

Motor Specifications	Unit	Value		
Motor	-	AKM30-B1	AKM30-B2	AKM30-B4
Continuous Force (NC) @100℃ ❶	N	108.4	216.8	433.6
Peak Force	N	241.6	483.2	966.3
Force Constant ±10%	N/Arms	23.0	45.9	45.9
Back EMF Constant ±10%	Vpeak/(m/s)	18.7	37.5	37.5
Resistance (L-L) @25℃ ±10% ❷	Ω	1.1	2.2	1.1
Inductance (L-L) ±30% ❸	mH	21.0	42.0	21.0
Continuous Current (NC) @100℃ ❶	Arms	4.8	4.8	9.6
Peak Current	Arms	14.4	14.4	28.8
Max. Bus Voltage	Vdc	600	600	600
Magnetic Period	mm	42	42	42
Mechanical Specifications	**Unit**	**Value**		
Linear Guide Nominal Size	-	15		
Resolution	μm	Magnetic scale: 1.0		
		Optical scale: 0.5/0.05		
Repeatability	μm	Magnetic scale: ±4		
		Optical scale: ±2		
Straightness	μm/mm	±7/300	±7/300	±7/300
Maximum Velocity	m/s	3	3	3
Maximum Bearing Load	N	1950	3120	4680
Rated Payload ❹	kg	15	25	40
No-load Moving Mass	kg	2.7	4.6	8.4
Mounting Orientation	-	Horizontal or side orientation		

❶ Measurement is taken at ambient temperature 25℃. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
❹ Rated payload based on 2m/s velocity and continuous force 100% duty. Module load capacity can be better based on actual condition, please contact sales engineer.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

DGC130B-S01-K01A0F1-A2

Model:
DGC130B

Cover Type:
S: Standard (Clear Anodized)

Effective Stroke: ❶
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm

Termination:
1: Motor: Flying Leads/ Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/ Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K
7: Magnetic Tape, 17ppm/K

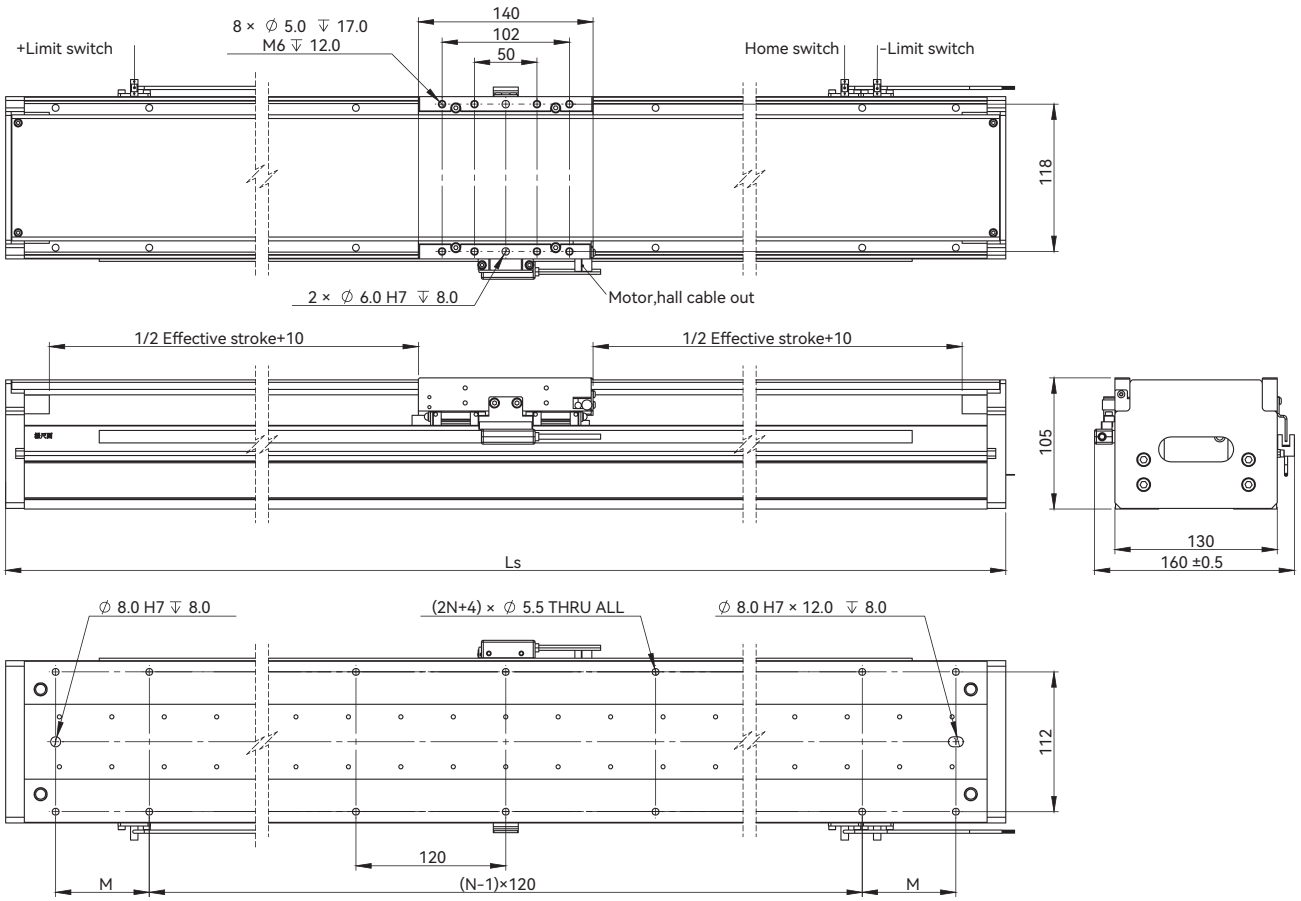
Encoder Type:
A73: ABA-50, EnDat 2.2 (50nm)
A0F: ABI21, TTL (0.5μm) ❷
S1E: MAGNET (1.0μm)

Motor Type:
K01: AKM30-B1-J (Peak Force: 241.6N)
K03: AKM30-B2-J (Peak Force: 483.2N)
K05: AKM30-B4-J (Peak Force: 966.3N)

Note:
❶ Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers.
❷ Standard stroke up to 1100mm only when Encoder ABI21 is selected.
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

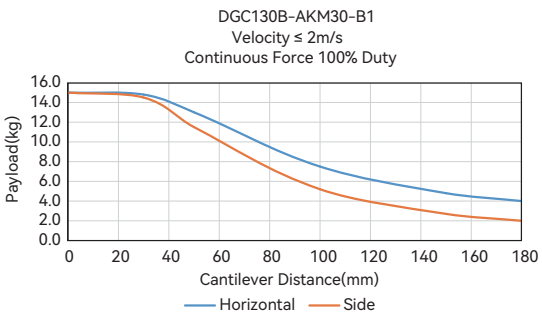
DGC130B Series

DGC130B-AKM30-B1 Dimensional Drawing



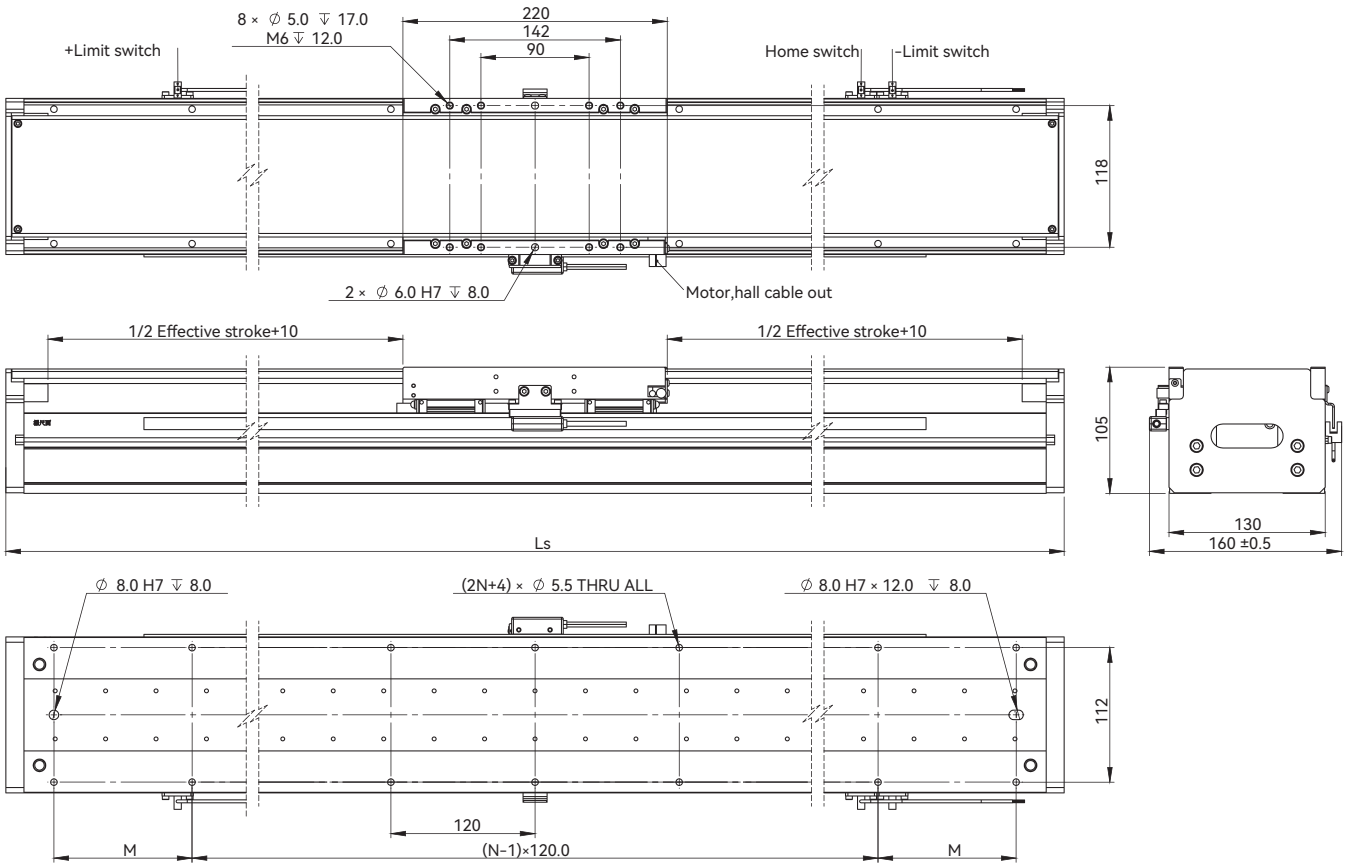
Effective Stroke(mm)	Module Length,Ls (mm)	N	M (mm)	Module Mass (kg)
100	330	1	125	8.3
200	430	3	55	9.8
300	530	3	105	11.4
400	630	5	35	13.0
500	730	5	85	14.6
600	830	7	15	16.3
700	930	7	65	17.8
800	1030	7	115	19.4
900	1130	9	45	21.0
1000	1230	9	95	22.6
1100	1330	11	25	24.1
1200	1430	11	75	25.8

Cantilever-Payload Curve



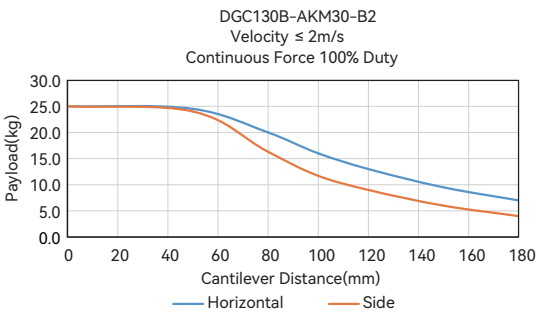
DGC130B Series

DGC130B-AKM30-B2 Dimensional Drawing



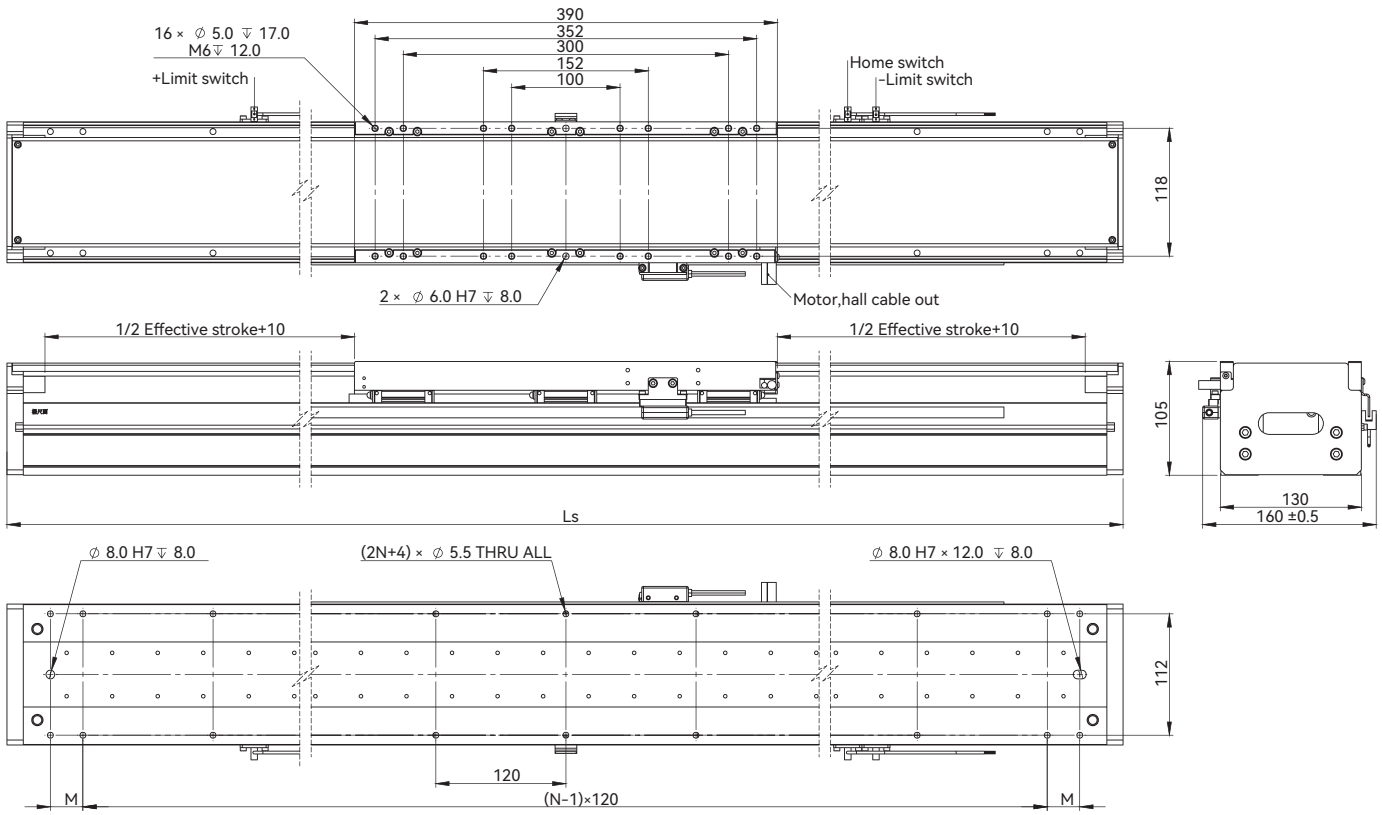
Effective Stroke(mm)	Module Length,Ls (mm)	N	M (mm)	Module Mass (kg)
100	410	3	45	11.4
200	510	3	95	13.0
300	610	5	25	14.5
400	710	5	75	16.2
500	810	5	125	17.8
600	910	7	55	19.3
700	1010	7	105	21.0
800	1110	9	35	22.5
900	1210	9	85	24.2
1000	1310	11	15	25.8
1100	1410	11	65	27.3
1200	1510	11	115	29.0

Cantilever-Payload Curve



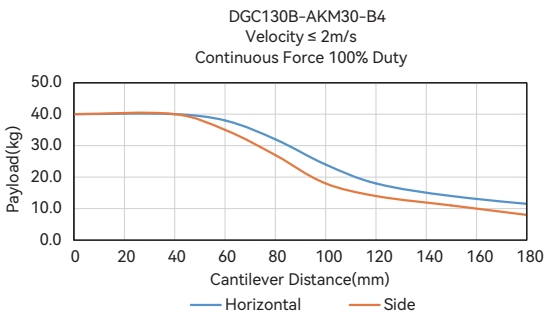
DGC130B Series

DGC130B-AKM30-B4 Dimensional Drawing



Effective Stroke (mm)	Module Length,Ls (mm)	N	M (mm)	Module Mass (kg)
100	580	3	130	17.9
200	680	5	60	19.5
300	780	5	110	21.0
400	880	7	40	22.7
500	980	7	90	24.2
600	1080	9	20	25.9
700	1180	9	70	27.5
800	1280	9	120	29.0
900	1380	11	50	30.7
1000	1480	11	100	32.2
1100	1580	13	30	33.8
1200	1680	13	80	35.5

Cantilever-Payload Curve



DGC175B Series

Motor Specifications	Unit	Value			
Motor	-	AKM50-B1	AKM50-B2	AKM50-B3-D67	AKM50-B4
Continuous Force (NC) @100℃ ❶	N	180.7	361.3	542.0	722.6
Peak Force	N	402.6	805.3	1208.0	1610.5
Force Constant ±10%	N/Arms	38.3	76.5	57.0	76.5
Back EMF Constant ±10%	Vpeak/(m/s)	31.2	62.5	47.0	62.5
Resistance (L-L) @25℃ ±10% ❷	Ω	1.4	2.8	1.1	1.4
Inductance (L-L) ±30% ❸	mH	31.8	63.6	23.9	31.8
Continuous Current (NC) @100℃ ❶	Arms	4.8	4.8	9.6	9.6
Peak Current	Arms	14.4	14.4	28.8	28.8
Max. Bus Voltage	Vdc	600	600	600	600
Magnetic Period	mm	42	42	42	42
Mechanical Specifications	**Unit**	**Value**			
Linear Guide Nominal Size	-	20			
Resolution	μm	Magnetic scale: 1.0			
		Optical scale: 0.5/0.05			
Repeatability	μm	Magnetic scale: ±4			
		Optical scale: ±2			
Straightness	μm/mm	±7/300	±7/300	±7/300	±7/300
Maximum Velocity	m/s	3	3	3	3
Maximum Bearing Load	N	2770	4050	4050	6050
Rated Payload ❹	kg	30	50	60	70
No-load Moving Mass	kg	4.0	7.0	9.6	12.5
Mounting Orientation	-	Horizontal orientation	Horizontal or side orientation		

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
❹ Rated payload based on 2m/s velocity and continuous force 100% duty. Module load capacity can be better based on actual condition, please contact sales engineer.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

DGC175B-S01-K20ABF1-A2-CG-CLS

Model:
DGC175B

Cover Type:
S: Standard (Clear Anodized)

Effective Stroke: ❶
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm
13: 1300mm
14: 1400mm

Motor Type:
K20: AKM50-B1-J (Peak Force: 402.6N)
K22: AKM50-B2-J (Peak Force: 805.3N)
K26: AKM50-B3-J (Peak Force: 1208.0N)
K24: AKM50-B4-J (Peak Force: 1610.5N)

Lubrication Method:
Unmarked: Normal Lubrication
CLS: Centralized Lubrication

Mounting Orientation:
Unmarked: Horizontal Orientation
CG: Side Orientation

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

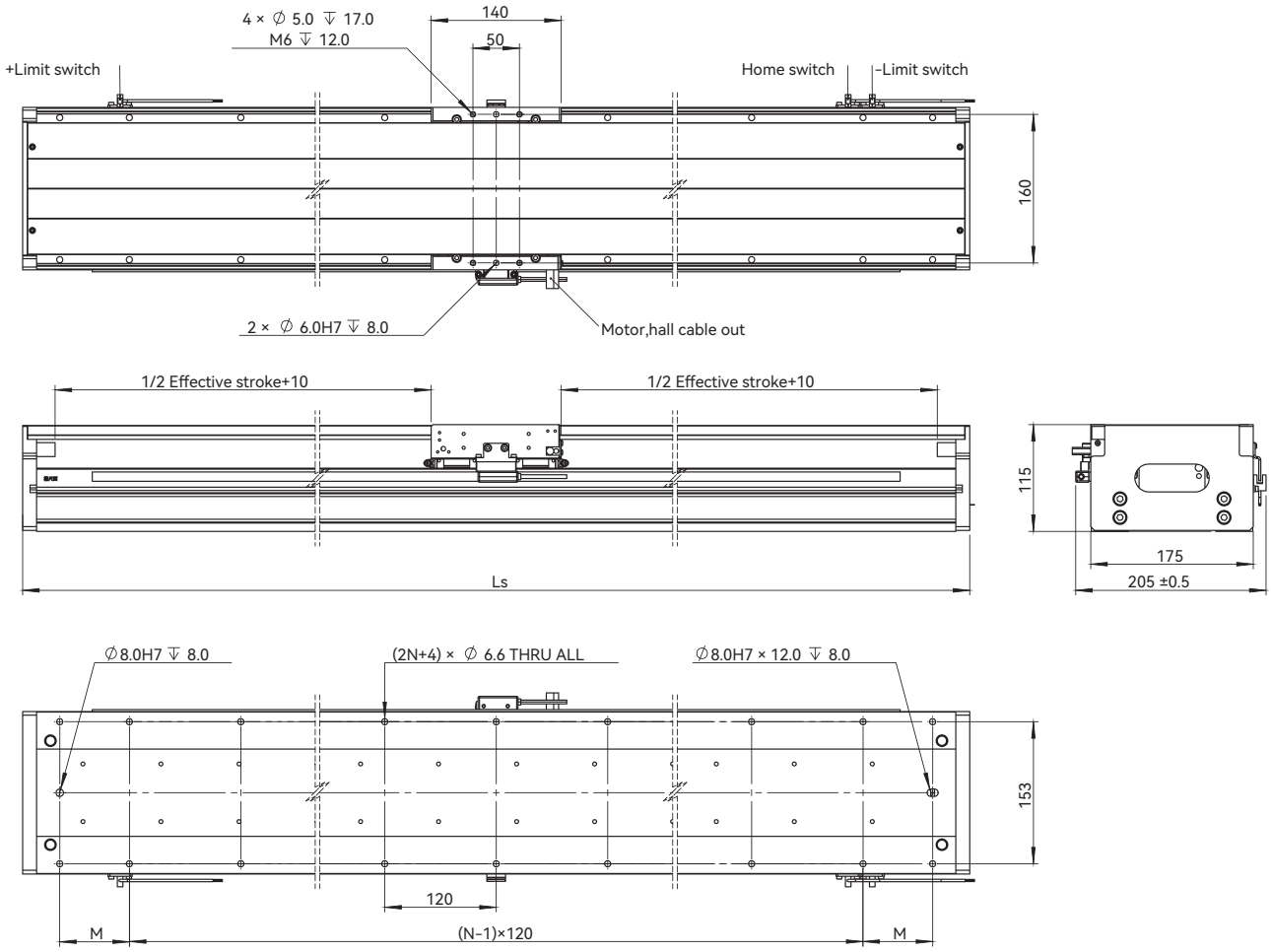
Scale Type:
1: Steel Tape, 11ppm/K
7: Magnetic Tape, 17ppm/K

Encoder Type:
A73: ABA-50, EnDat 2.2 (50nm)
ABF: ABI51X (0.5μm)
S1E: MAGNET(1.0μm)

Note:
❶ Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers.
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

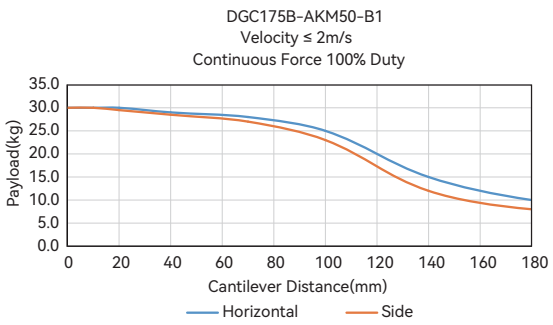
DGC175B Series

DGC175B-AKM50-B1 Dimensional Drawing



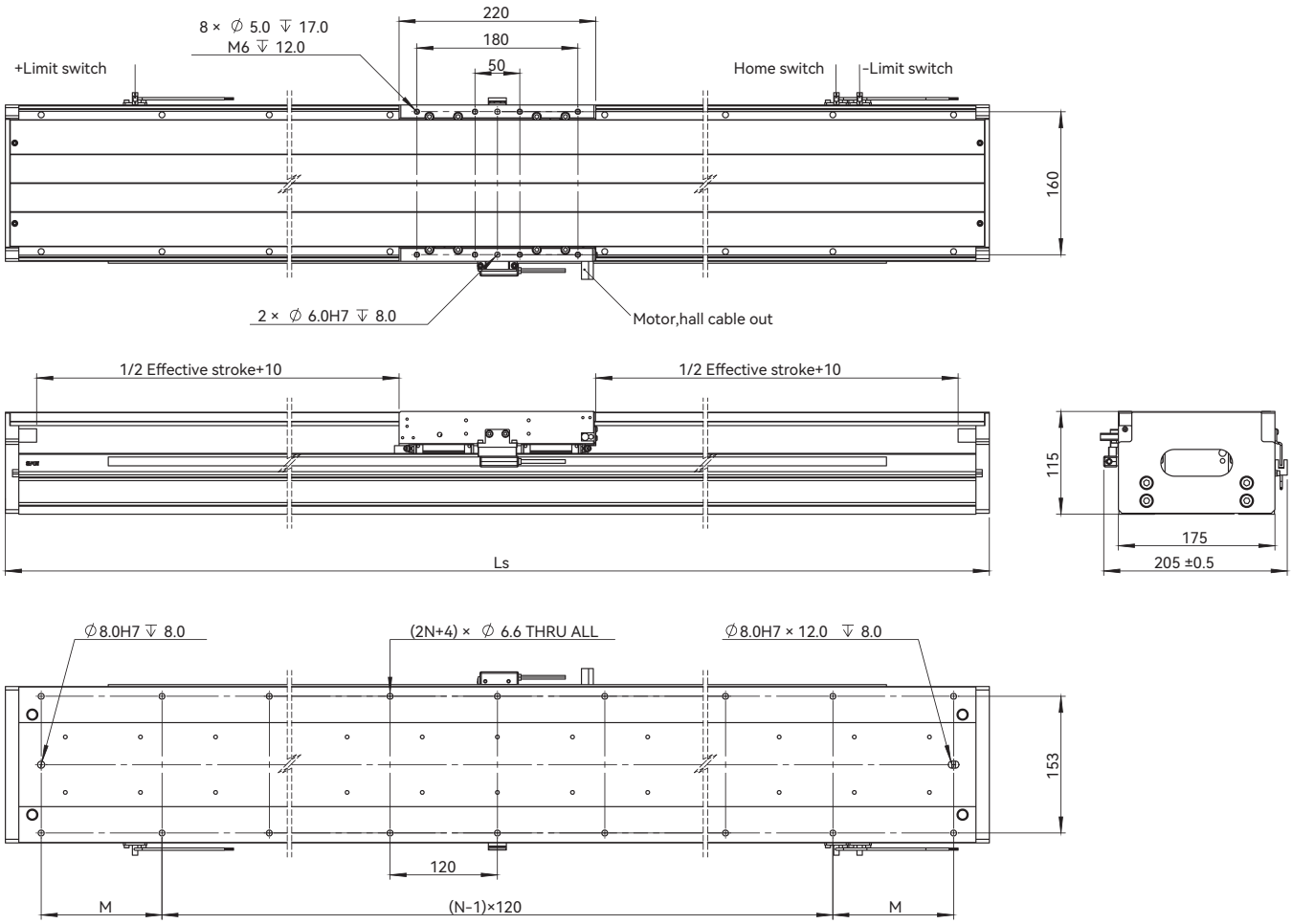
Effective Stroke(mm)	Module Length Ls (mm)	N	M (mm)	Module Mass (kg)
100	330	1	125	11.7
200	430	3	55	13.9
300	530	3	105	16.4
400	630	5	35	18.8
500	730	5	85	21.0
600	830	5	135	23.2
700	930	7	65	25.4
800	1030	7	115	27.8
900	1130	9	45	30.2
1000	1230	9	95	32.5
1100	1330	11	25	34.7
1200	1430	11	75	36.9
1300	1530	11	125	39.3
1400	1630	13	55	41.7

Cantilever-Payload Curve



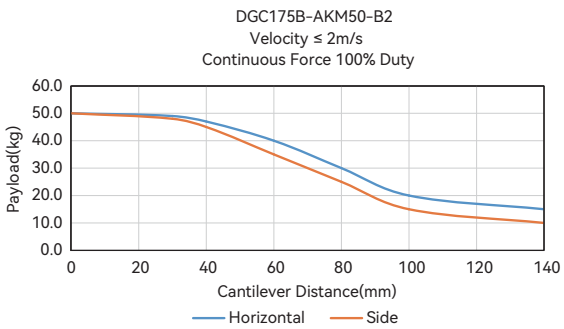
DGC175B Series

DGC175B-AKM50-B2 Dimensional Drawing



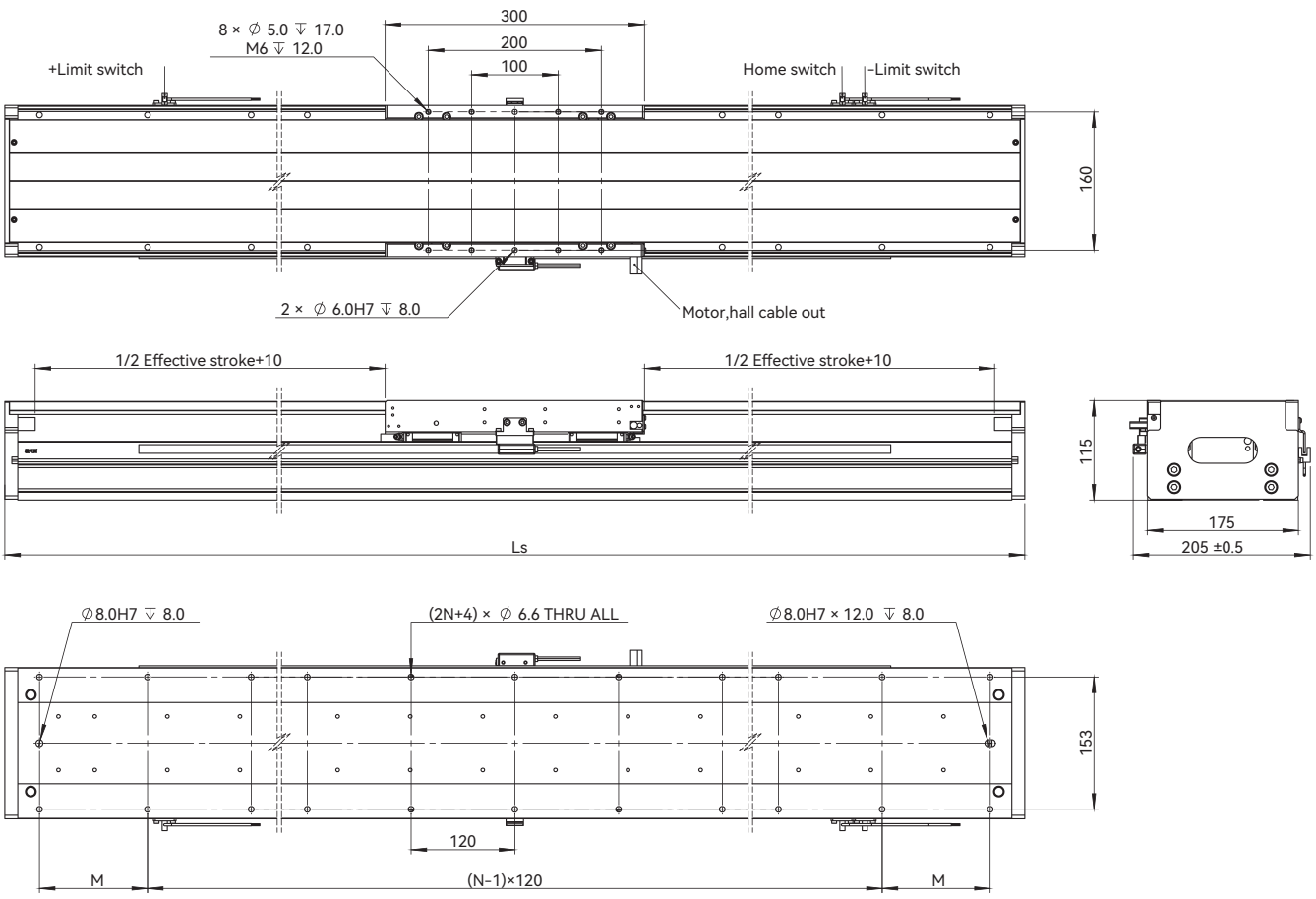
Effective Stroke(mm)	Module Length,Ls (mm)	N	M (mm)	Module Mass (kg)
100	410	3	45	16.6
200	510	3	95	18.8
300	610	5	25	21.2
400	710	5	75	23.6
500	810	5	125	25.9
600	910	7	55	28.1
700	1010	7	105	30.3
800	1110	9	35	32.7
900	1210	9	85	35.1
1000	1310	9	135	37.3
1100	1410	11	65	39.5
1200	1510	11	115	41.7
1300	1610	13	45	44.2
1400	1710	13	95	46.4

Cantilever-Payload Curve



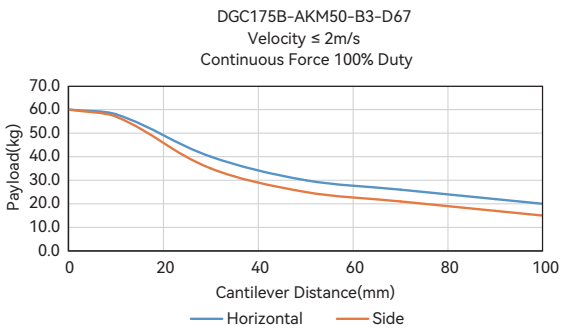
DGC175B Series

DGC175B-AKM50-B3-D67 Dimensional Drawing



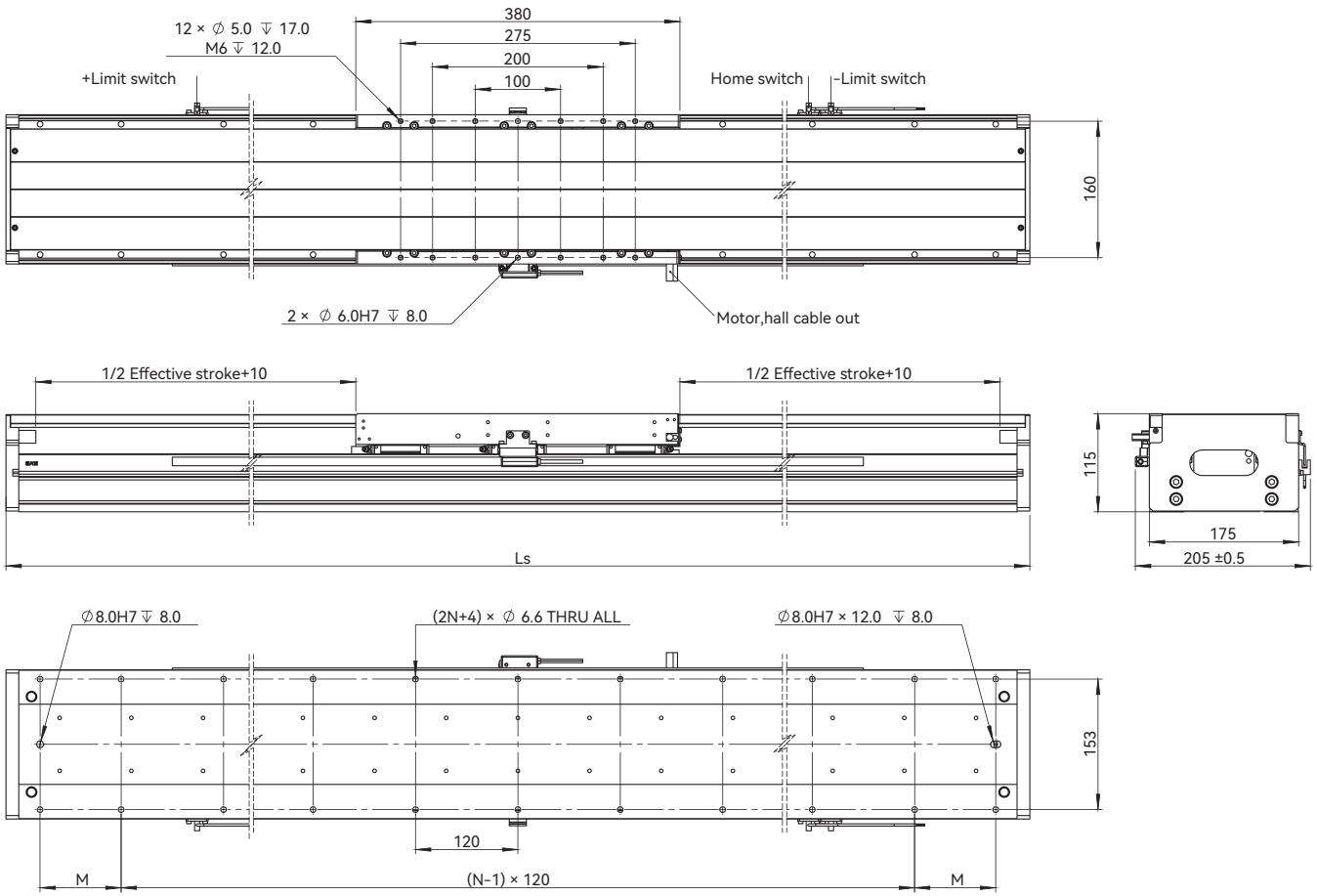
Effective Stroke(mm)	Module Length Ls (mm)	N	M (mm)	Module Mass (kg)
100	490	3	85	21.0
200	590	3	135	23.2
300	690	5	65	25.6
400	790	5	115	28.0
500	890	7	45	30.3
600	990	7	95	32.5
700	1090	9	25	34.7
800	1190	9	75	37.1
900	1290	9	125	39.3
1000	1390	11	55	41.7
1100	1490	11	105	43.9
1200	1590	13	35	46.1
1300	1690	13	85	48.6
1400	1790	13	135	50.8

Cantilever-Payload Curve



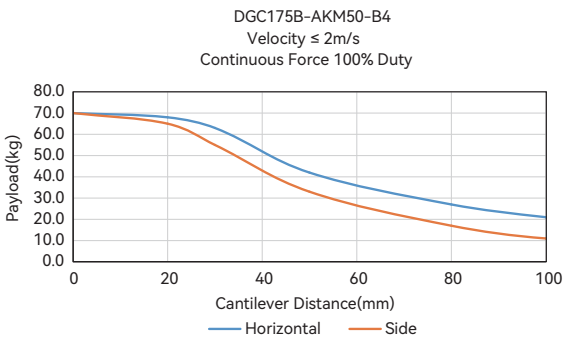
DGC175B Series

DGC175B-AKM50-B4 Dimensional Drawing



Effective Stroke(mm)	Module Length,Ls (mm)	N	M (mm)	Module Mass (kg)
100	570	3	125	25.8
200	670	5	55	28.0
300	770	5	105	30.5
400	870	7	35	32.7
500	970	7	85	35.1
600	1070	7	135	37.3
700	1170	9	65	39.5
800	1270	9	115	41.9
900	1370	11	45	44.1
1000	1470	11	95	46.5
1100	1570	13	25	48.7
1200	1670	13	75	51.0
1300	1770	13	125	53.4
1400	1870	15	55	55.6

Cantilever-Payload Curve



DGC235 Series

Motor Specifications	Unit	Value		
Motor	-	AKM100-B2	AKM100-B3-D69	AKM100-B4
Continuous Force (NC) @100°C [1]	N	722.6	1084.0	1445.3
Peak Force	N	1610.5	2416.0	3221.1
Force Constant ±10%	N/Arms	153	77	153
Back EMF Constant ±10%	Vpeak/(m/s)	124.9	62.0	124.9
Resistance (L-L) @25°C ±10% [2]	Ω	4.6	0.8	2.3
Inductance (L-L) ±30% [3]	mH	116.0	19.0	58.0
Continuous Current (NC) @100°C [1]	Arms	4.8	14.4	9.6
Peak Current	Arms	14.4	43.2	28.8
Max. Bus Voltage	Vdc	600	600	600
Magnetic Period	mm	42	42	42
Mechanical Specifications	**Unit**	**Value**		
Linear Guide Nominal Size	-	25		
Resolution	μm	Magnetic scale: 1.0		
		Optical scale: 0.5/0.05		
Repeatability	μm	Magnetic scale: ±4		
		Optical scale: ±2		
Straightness	μm/mm	±7/300	±7/300	±7/300
Maximum Velocity	m/s	3	3	3
Maximum Bearing Load	N	6480	6480	9720
Rated Payload [4]	kg	70	80	100
No-load Moving Mass	kg	11.5	15.5	20.5
Mounting Orientation	-	Horizontal or side orientation		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5m lead wire.
[3] Inductance is measured by current frequency of 1 kHz.
[4] Rated payload based on 2m/s velocity and continuous force 100% duty. Module load capacity can be better based on actual condition, please contact sales engineer.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

DGC235-S01-K42ABF1-A2-CG-CLS

Model:
DGC235

Cover Type:
S: Standard (Clear Anodized)

Effective Stroke: [1]
01: 100mm
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm
09: 900mm
10: 1000mm
11: 1100mm
12: 1200mm
13: 1300mm
14: 1400mm

Motor Type:
K42: AKM100-B2-J (Peak Force: 1610.5N)
K46: AKM100-B3-J (Peak Force: 2416.0N)
K44: AKM100-B4-J (Peak Force: 3221.1N)

Lubrication Method:
Unmarked: Normal Lubrication
CLS: Centralized Lubrication

Mounting Orientation:
Unmarked: Horizontal Orientation
CG: Side Orientation

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

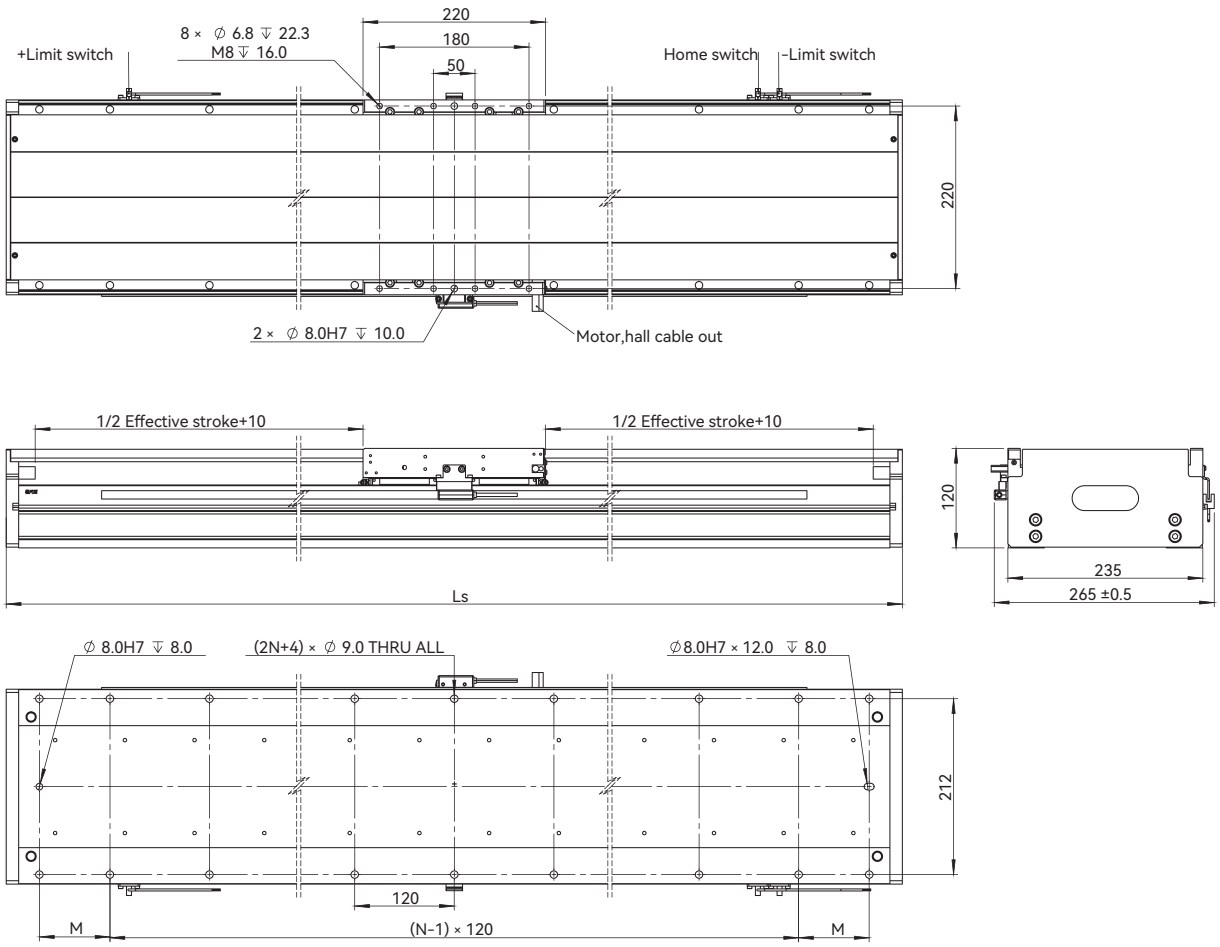
Scale Type:
1: Steel Tape, 11ppm/K
7: Magnetic Tape, 17ppm/K

Encoder Type:
A73: ABA-50, EnDat 2.2 (50nm)
ABF: ABI51X (0.5μm)
S1E: MAGNET(1.0μm)

Note:
[1] Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers.
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

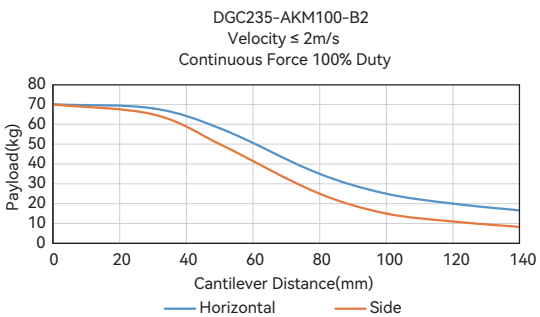
DGC235 Series

DGC235-AKM100-B2 Dimensional Drawing



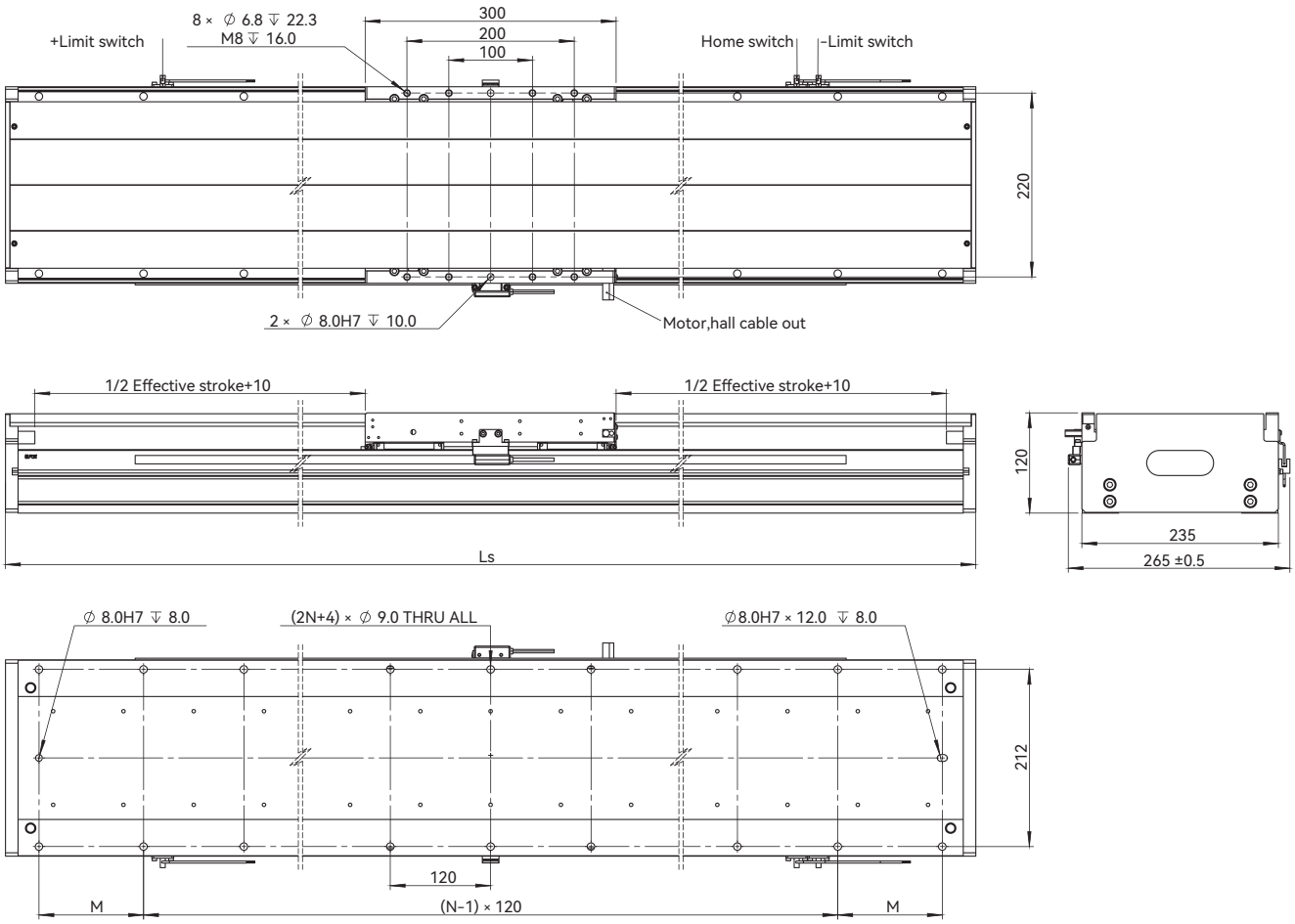
Effective Stroke(mm)	Module Length Ls (mm)	N	M (mm)	Module Mass (kg)
100	410	3	45	25.1
200	510	3	95	28.3
300	610	5	25	31.4
400	710	5	75	35.3
500	810	5	125	38.4
600	910	7	55	41.5
700	1010	7	105	44.7
800	1110	9	35	47.8
900	1210	9	85	51.7
1000	1310	9	135	54.8
1100	1410	11	65	58.0
1200	1510	11	115	61.1
1300	1610	13	45	64.2
1400	1710	13	95	68.1

Cantilever-Payload Curve



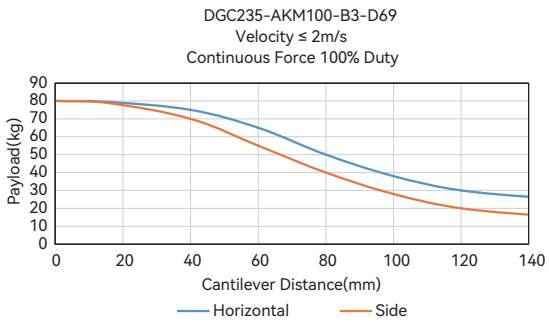
DGC235 Series

DGC235-AKM100-B3-D69 Dimensional Drawing



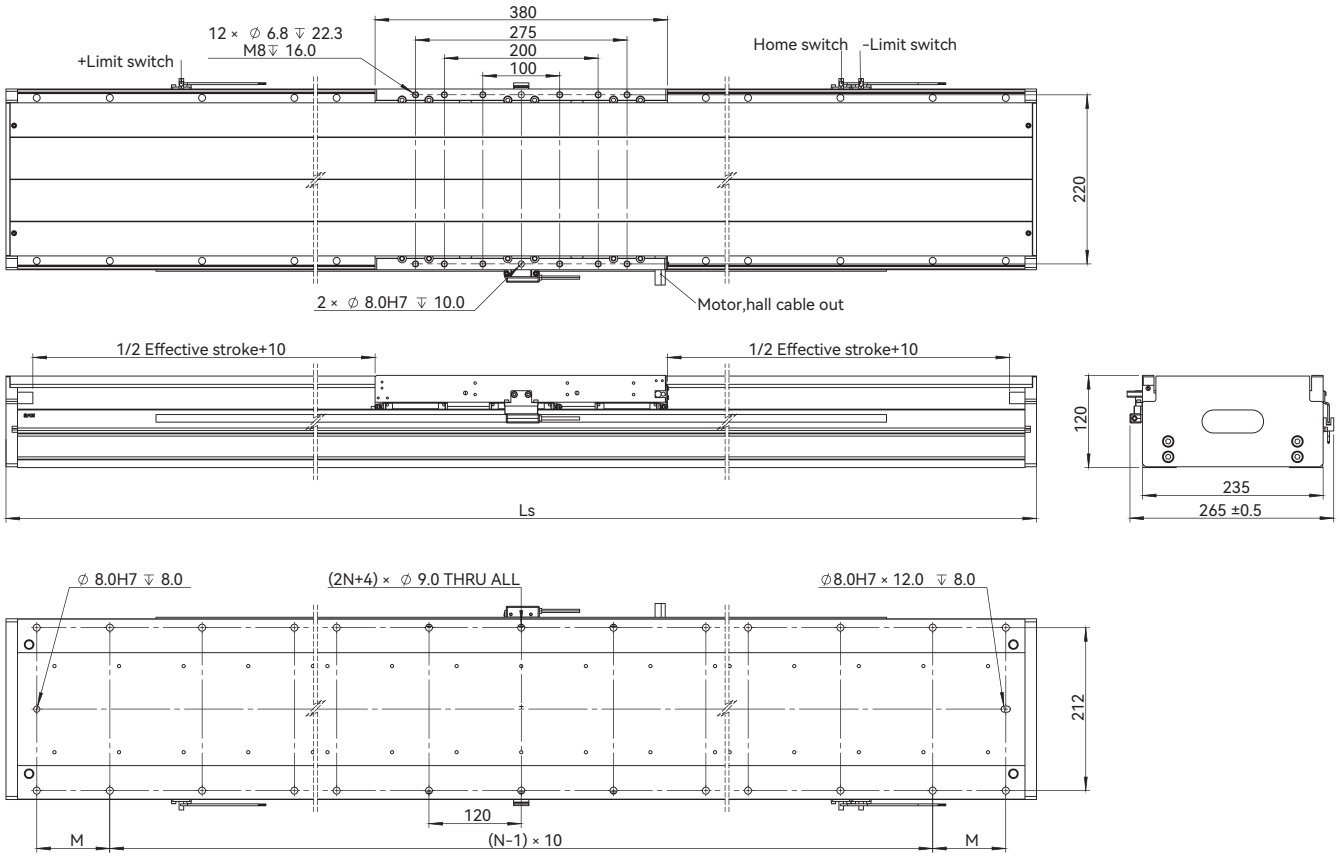
Effective Stroke(mm)	Module Length Ls (mm)	N	M (mm)	Module Mass (kg)
100	490	3	85	31.9
200	590	3	135	35.0
300	690	5	65	38.2
400	790	5	115	42.0
500	890	7	45	45.2
600	990	7	95	48.3
700	1090	9	25	51.4
800	1190	9	75	54.6
900	1290	9	125	58.5
1000	1390	11	55	61.6
1100	1490	11	105	64.7
1200	1590	13	35	67.8
1300	1690	13	85	71.0
1400	1790	13	135	74.2

Cantilever-Payload Curve



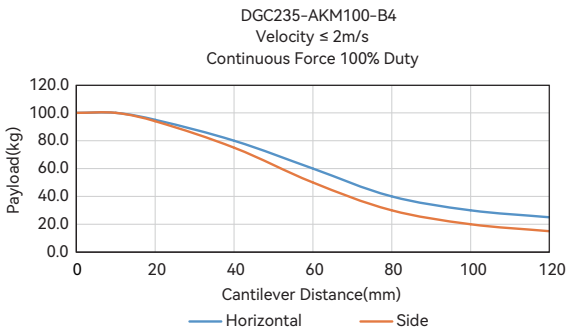
DGC235 Series

DGC235-AKM100-B4 Dimensional Drawing



Effective Stroke(mm)	Module Length,Ls (mm)	N	M (mm)	Module Mass (kg)
100	570	3	125	39.6
200	670	5	55	42.7
300	770	5	105	45.9
400	870	7	35	49.7
500	970	7	85	52.9
600	1070	7	135	56.0
700	1170	9	65	59.2
800	1270	9	115	62.3
900	1370	11	45	65.4
1000	1470	11	95	69.3
1100	1570	13	25	72.4
1200	1670	13	75	75.6
1300	1770	13	125	78.7
1400	1870	15	55	81.9

Cantilever-Payload Curve



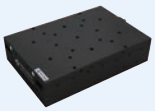
CROSS ROLLER MODULES

CROSS ROLLER MODULES

Overview

Akribis cross roller module is a high-precision linear module driven by a U-shaped linear motor that is ironless and without cogging. The cross roller guiderail with high-precision optical encoder and high-precision machining quality ensure the high precision and stability of the module, so that the motion control of the module has excellent repeatability, straightness and flatness, as well as low friction, fast response, short settling time and low velocity ripple.

Cross Roller Modules



XRL Series

- Cross roller guide linear motor stage
- Built-in U type linear motor
- Stroke from 35mm to 160mm
- Optional resolution of 0.1μm, minimum resolution up to 2.44nm
- Excellent straightness and flatness, high load capacity

▶ Applicable to:

- Point to point sub-micron and nanometer level fast positioning, optical focus for Z axis
- High/low speed applications with demanding velocity ripple or motion profile requirements
- Light load and requirement of compact size

★ Applications:

Front-end and Back-end wafer transport and inspection, genetic sequencing, ultra precision assembly, laser micro-processing scenarios which require high precision and harsh trajectory following.

XRG Series

- Micro direct drive pitch and roll positioning stage
- Anti-creep cross roller guide rail
- Repeatability up to 4.0 arcsec

▶ Applicable to:

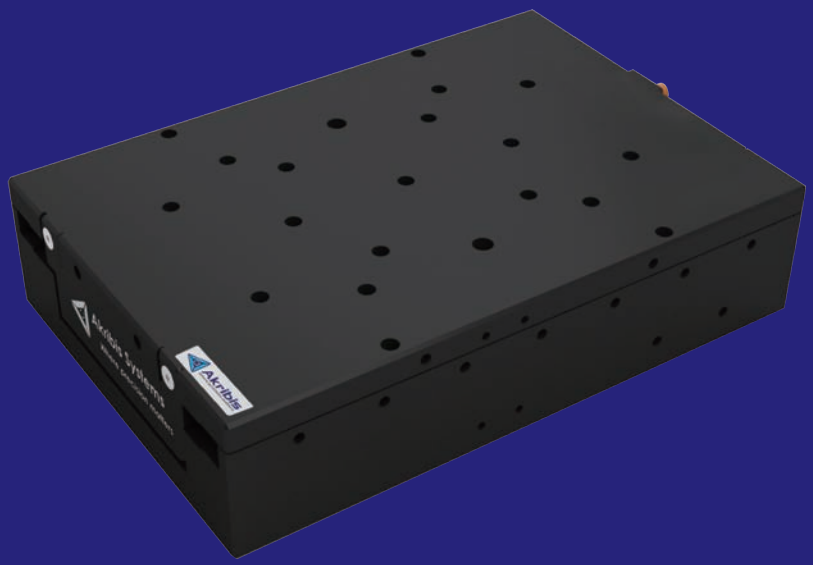
- Suitable for high precision Angle positioning, optical alignment stage

★ Applications:

They are applied to point-to-point high-speed angular component positioning, optical alignment, optical focusing, flying probe test, fibre optic alignment and assembly for automation equipment of all industry.

Product Type	Repeatability	3N	5N	10N	30N	50N	100N	300N	500N
 XRL	up to ±0.1 μm					Fcn=26.4N~70.4N Fpk=132.0N~352.0N			
 XRG	up to 4.0 arcsec		Tcn=0.602Nm ~ 1.070Nm Tpk=1.697Nm ~ 3.210Nm						

Applications: Used in electrical and semiconductor manufacturing, solar PV and lithium battery manufacturing equipment, LCD display, hard disc, PCB, high precision manufacturing, CNC, automotive electronics, packaging, printing, optics and bio-medical industry etc.



XRL SERIES

- Suitable for smooth movement
- Fast response and short settling time
- Low friction
- High precision

EN-25.5.1

XRL Series

Introduction

XRL series utilize linear motor positioning system, it consists of cross roller linear guide, linear motor, encoder feedback and aluminum cover to form a compact footprint and high performance module.

There are two standard products: XRL130 and XRL250. The built-in linear motor and encoders for the two standard products are selectable according to the actual technical requirements and customization is accepted.

Built in AUM iron less linear motor is cogging free with cross roller linear guide. Suitable for light load, low velocity, high precision positioning application.

Continuous Force Fcn = 26.4N~70.4N
Peak Force Fpk = 132.0N~352.0N

Features

- Cross roller guide linear motor stage
- Built-in AUM ironless linear motor
- Repeatability up to ±0.1μm
- Stroke from 35mm to 210mm
- Optional resolution of 0.1μm, SINCOS
- Excellent straightness and flatness, high load capacity

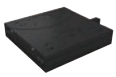
Applications

Point to point sub-micron and nanometer level fast positioning, optical focus for Z axis.

Good velocity ripple of high or low velocity and harsh trajectory following.

Light load and requirement of compact size.

High precision positioning in semiconductor, solar PV, lithium battery, LCD display equipment. And industrial printer and laser manufacturing scenarios which require high velocity, high precision, harsh trajectory following and velocity ripples.

Cross Roller Modules Series	Linear Motor Series		■ Continuous Force (F_{cn}) ■ Peak Force (F_{pk}) Unit: N 10 / 50 / 100 / 200 / 300 / 400	Stroke[1] (mm)	Repeatability (μm)	Page
 XRL130	 AUM2	AUM2-S3	26.4 / 132.0	35/60/ 110/160	up to ±0.1	081 ~ 082
 XRL250	 AUM2	AUM2-S4	70.4 / 352.0	35/60/ 110/160/ 210	up to ±0.15	084 ~ 086

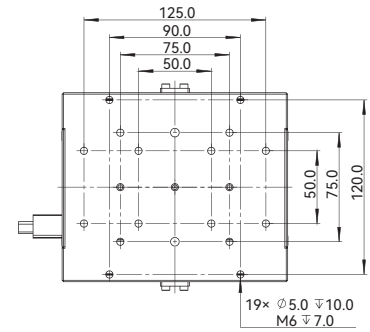
Note:
[1] Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

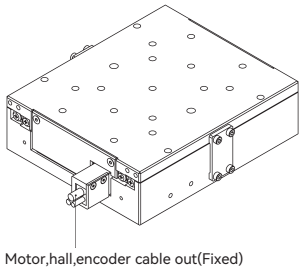
XRL130-35

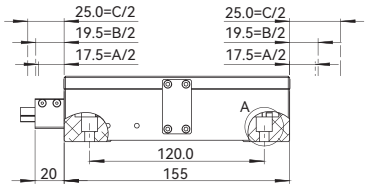
Motor Specifications	Unit	Value	
Motor	-	AUM2-S3	
Continuous Force (NC) @100℃ [1]	N	26.4	
Peak Force	N	132.0	
Force Constant ±10%	N/Arms	16.5	
Back EMF Constant ±10%	Vpeak/(m/s)	13.5	
Resistance (L-L) @25℃ ±10% [2]	Ω	9.95	
Inductance (L-L) ±40% [3]	mH	2.94	
Continuous Current (NC) @100℃ [1]	Arms	1.6	
Peak Current	Arms	8.0	
Max. Bus Voltage	Vdc	330	
Magnetic Period	mm	30	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	35	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.1	±0.3
Horizontal Straightness	μm	±1.0	±1.5
Vertical Straightness	μm	±1.0	±1.5
Rated Payload [4]	kg	7.0	
No-load Moving Mass	kg	1.5	
No-load Total Mass	kg	2.8	
Max. Static Moment [4]	Nm	5.0	

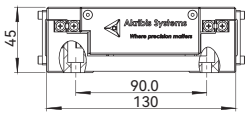
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC=Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.
The contents of datasheet are subject to change without prior notice.

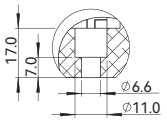
Dimensional Drawing




Motor,hall,encoder cable out(Fixed)







DETAIL A
SCALE 1 : 1
MOUNTING HOLES TYP.

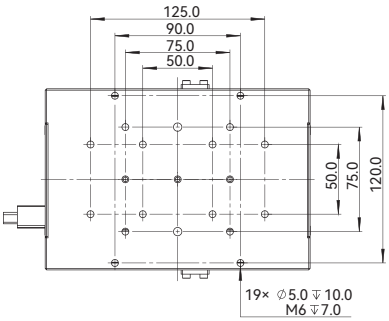
Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

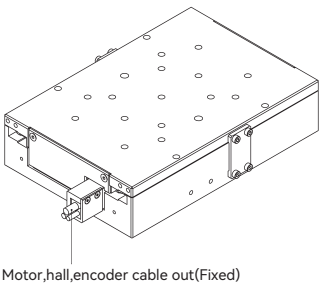
XRL130-60

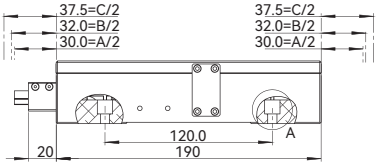
Motor Specifications	Unit	Value	
Motor	-	AUM2-S3	
Continuous Force (NC) @100℃ [1]	N	26.4	
Peak Force	N	132.0	
Force Constant ±10%	N/Arms	16.5	
Back EMF Constant ±10%	Vpeak/(m/s)	13.5	
Resistance (L-L) @25℃ ±10% [2]	Ω	9.95	
Inductance (L-L) ±40% [3]	mH	2.94	
Continuous Current (NC) @100℃ [1]	Arms	1.6	
Peak Current	Arms	8.0	
Max. Bus Voltage	Vdc	330	
Magnetic Period	mm	30	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	60	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.1	±0.3
Horizontal Straightness	μm	±1.0	±1.5
Vertical Straightness	μm	±1.0	±1.5
Rated Payload [4]	kg	9.0	
No-load Moving Mass	kg	1.7	
No-load Total Mass	kg	3.2	
Max. Static Moment [4]	Nm	6.0	

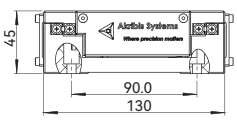
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC=Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.
The contents of datasheet are subject to change without prior notice.

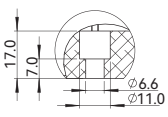
Dimensional Drawing




Motor,hall,encoder cable out(Fixed)







DETAIL A
SCALE 1 : 1
MOUNTING HOLES TYP.

Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

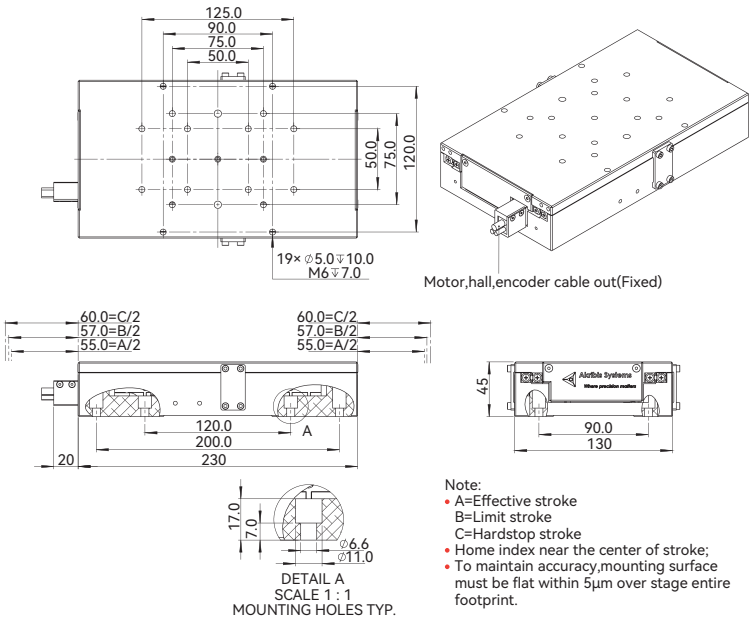
XRL130-110

Motor Specifications	Unit	Value	
Motor	-	AUM2-S3	
Continuous Force (NC) @100℃ [1]	N	26.4	
Peak Force	N	132.0	
Force Constant ±10%	N/Arms	16.5	
Back EMF Constant ±10%	Vpeak/(m/s)	13.5	
Resistance (L-L) @25℃ ±10% [2]	Ω	9.95	
Inductance (L-L) ±40% [3]	mH	2.94	
Continuous Current (NC) @100℃ [1]	Arms	1.6	
Peak Current	Arms	8.0	
Max. Bus Voltage	Vdc	330	
Magnetic Period	mm	30	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	110	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.1	±0.3
Horizontal Straightness	μm	±1.0	±2.0
Vertical Straightness	μm	±1.0	±2.0
Rated Payload [4]	kg	11.0	
No-load Moving Mass	kg	2.1	
No-load Total Mass	kg	3.9	
Max. Static Moment [4]	Nm	7.0	

[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
Abbreviations: NC=Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

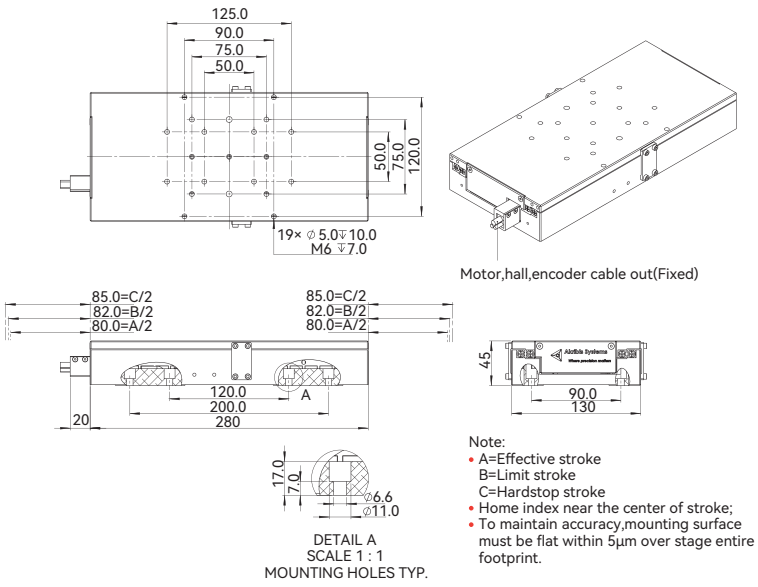
XRL130-160

Motor Specifications	Unit	Value
Motor	-	AUM2-S3
Continuous Force (NC) @100℃ [1]	N	26.4
Peak Force	N	132.0
Force Constant ±10%	N/Arms	16.5
Back EMF Constant ±10%	Vpeak/(m/s)	13.5
Resistance (L-L) @25℃ ±10% [2]	Ω	9.95
Inductance (L-L) ±40% [3]	mH	2.94
Continuous Current (NC) @100℃ [1]	Arms	1.6
Peak Current	Arms	8.0
Max. Bus Voltage	Vdc	330
Magnetic Period	mm	30
Mechanical Specifications	**Unit**	**Value**
Precision Grade	-	N
Effective Stroke	mm	160
Resolution	μm	0.1
Repeatability	μm	±0.3
Horizontal Straightness	μm	±2.0
Vertical Straightness	μm	±2.0
Rated Payload [4]	kg	13.0
No-load Moving Mass	kg	2.3
No-load Total Mass	kg	4.2
Max. Static Moment [4]	Nm	8.0

[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
Abbreviations: NC=Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

Ordering Part Number (OPN)

XRL130-T03-U04R2H1-D1

- Model: XRL130
- Precision Grade: Unmarked: Normal
- Cover Type: T: Standard (Black Anodized)
- Effective Stroke: 03: 35mm; 06: 60mm; 11: 110mm; 16: 160mm
- Motor Type: U04: AUM2-S-S3-K (Peak Force: 132.0N)
- Encoder Type: R2H: Quantic, TTL (0.1μm)
- Scale Type: 1: Steel Tape, 11ppm/K
- Cable Length: D: 1.0m
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9; 2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

XRL130P-T03-U04R4A1-D1

- Model: XRL130
- Precision Grade: P: Precision
- Cover Type: T: Standard (Black Anodized)
- Effective Stroke: 03: 35mm; 06: 60mm; 11: 110mm
- Motor Type: U04: AUM2-S-S3-K (Peak Force: 132.0N)
- Encoder Type: R4A: TONiC, SINCOS (1Vpp)
- Scale Type: 1: Steel Tape, 11ppm/K
- Cable Length: D: 1.0m
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9; 2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9

Note:

★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

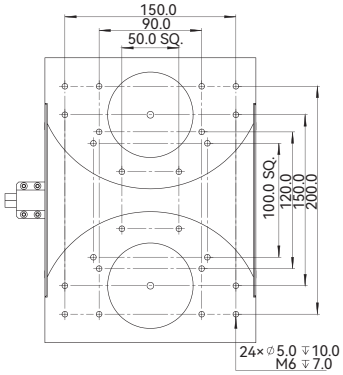
XRL250-35

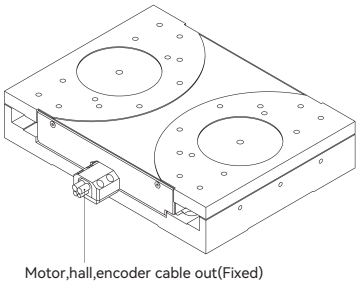
Motor Specifications	Unit	Value	
Motor	-	AUM2-S4×2	
Continuous Force (NC) @100℃ [1]	N	35.2×2	
Peak Force	N	176.0×2	
Force Constant ±10%	N/Arms	22.0	
Back EMF Constant ±10%	Vpeak/(m/s)	18.0	
Resistance (L-L) @25℃ ±10% [2]	Ω	6.59	
Inductance (L-L) ±40% [3]	mH	1.94	
Continuous Current (NC) @100℃ [1]	Arms	1.6×2	
Peak Current	Arms	8.0×2	
Max. Bus Voltage	Vdc	330	
Magnetic Period	mm	30	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	35	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.15	±0.3
Horizontal Straightness	μm	±1.0	±1.5
Vertical Straightness	μm	±1.0	±1.5
Rated Payload [4]	kg	20.0	
No-load Moving Mass	kg	3.9	
No-load Total Mass	kg	7.0	
Max. Static Moment [4]	Nm	7.0	

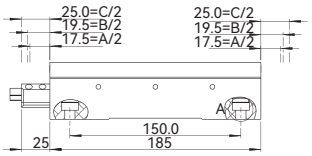
[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

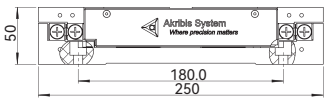
The contents of datasheet are subject to change without prior notice.

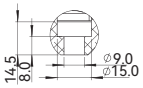
Dimensional Drawing











DETAIL A
SCALE 1 : 1
MOUNTING HOLES TYP.

Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

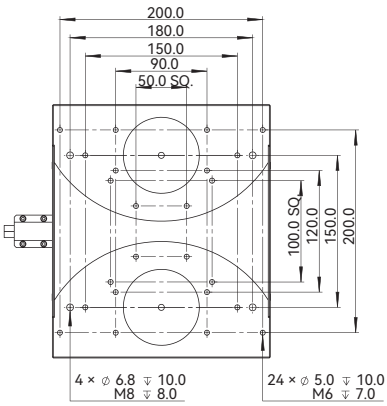
XRL250-60

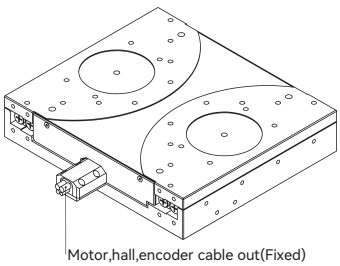
Motor Specifications	Unit	Value	
Motor	-	AUM2-S4×2	
Continuous Force (NC) @100℃ [1]	N	35.2×2	
Peak Force	N	176.0×2	
Force Constant ±10%	N/Arms	22.0	
Back EMF Constant ±10%	Vpeak/(m/s)	18.0	
Resistance (L-L) @25℃ ±10% [2]	Ω	6.59	
Inductance (L-L) ±40% [3]	mH	1.94	
Continuous Current (NC) @100℃ [1]	Arms	1.6×2	
Peak Current	Arms	8.0×2	
Max. Bus Voltage	Vdc	330	
Magnetic Period	mm	30	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	60	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.15	±0.3
Horizontal Straightness	μm	±1.0	±1.5
Vertical Straightness	μm	±1.0	±1.5
Rated Payload [4]	kg	25.0	
No-load Moving Mass	kg	4.6	
No-load Total Mass	kg	8.2	
Max. Static Moment [4]	Nm	10.0	

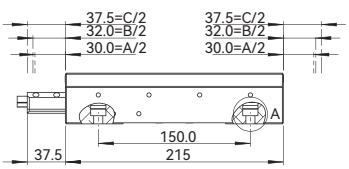
[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

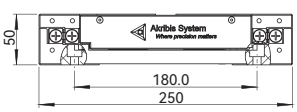
The contents of datasheet are subject to change without prior notice.

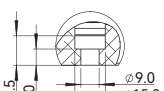
Dimensional Drawing











DETAIL A
SCALE 2 : 3
MOUNTING HOLES TYP.

Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

XRL250-110

Motor Specifications	Unit	Value	
Motor	-	AUM2-S4×2	
Continuous Force (NC) @100℃ [1]	N	35.2×2	
Peak Force	N	176.0×2	
Force Constant ±10%	N/Arms	22.0	
Back EMF Constant ±10%	Vpeak/(m/s)	18.0	
Resistance (L-L) @25℃ ±10% [2]	Ω	6.59	
Inductance (L-L) ±40% [3]	mH	1.94	
Continuous Current (NC) @100℃ [1]	Arms	1.6×2	
Peak Current	Arms	8.0×2	
Max. Bus Voltage	Vdc	330	
Magnetic Period	mm	30	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	110	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.15	±0.3
Horizontal Straightness	μm	±1.0	±2.0
Vertical Straightness	μm	±1.0	±2.0
Rated Payload [4]	kg	30.0	
No-load Moving Mass	kg	5.4	
No-load Total Mass	kg	9.7	
Max. Static Moment [4]	Nm	15.0	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.

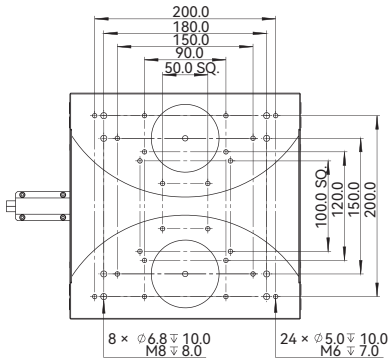
[2] Resistance is measured by DC current with standard 0.5m cable.

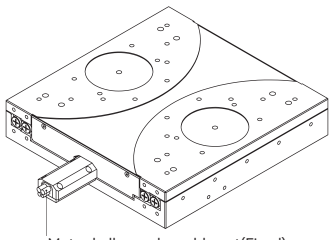
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

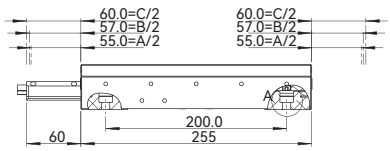
The contents of datasheet are subject to change without prior notice.

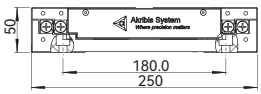
Dimensional Drawing

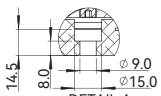




Motor,hall,encoder cable out(Fixed)







DETAIL A
SCALE 2 : 3
MOUNTING HOLES TYP.

Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

XRL250-160

Motor Specifications	Unit	Value	
Motor	-	AUM2-S4×2	
Continuous Force (NC) @100℃ [1]	N	35.2×2	
Peak Force	N	176.0×2	
Force Constant ±10%	N/Arms	22.0	
Back EMF Constant ±10%	Vpeak/(m/s)	18.0	
Resistance (L-L) @25℃ ±10% [2]	Ω	6.59	
Inductance (L-L) ±40% [3]	mH	1.94	
Continuous Current (NC) @100℃ [1]	Arms	1.6×2	
Peak Current	Arms	8.0×2	
Max. Bus Voltage	Vdc	330	
Magnetic Period	mm	30	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	160	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.15	±0.3
Horizontal Straightness	μm	±1.5	±2.0
Vertical Straightness	μm	±1.5	±2.0
Rated Payload [4]	kg	40.0	
No-load Moving Mass	kg	6.6	
No-load Total Mass	kg	11.6	
Max. Static Moment [4]	Nm	20.0	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.

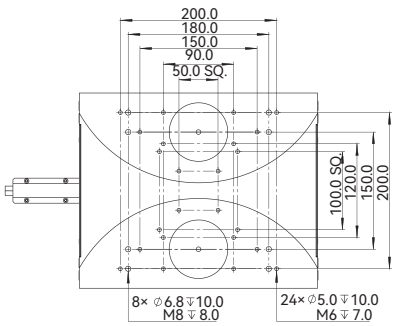
[2] Resistance is measured by DC current with standard 0.5m cable.

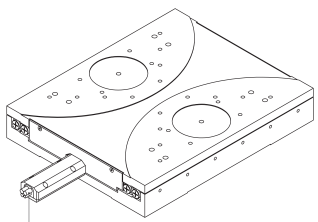
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

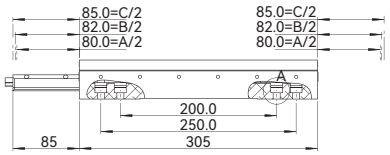
The contents of datasheet are subject to change without prior notice.

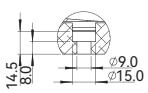
Dimensional Drawing





Motor,hall,encoder cable out(Fixed)





DETAIL A
SCALE 2 : 3
MOUNTING HOLES TYP.

Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

XRL250-210

Motor Specifications	Unit	Value
Motor	-	AUM2-S4×2
Continuous Force (NC) @100℃ [1]	N	35.2×2
Peak Force	N	176.0×2
Force Constant ±10%	N/Arms	22.0
Back EMF Constant ±10%	Vpeak/(m/s)	18.0
Resistance (L-L) @25℃ ±10% [2]	Ω	6.59
Inductance (L-L) ±40% [3]	mH	1.94
Continuous Current (NC) @100℃ [1]	Arms	1.6×2
Peak Current	Arms	8.0×2
Max. Bus Voltage	Vdc	330
Magnetic Period	mm	30

Mechanical Specifications	Unit	Value	
Precision Grade	-	P	N
Effective Stroke	mm	210	
Resolution	μm	SINCOS (4096X)	0.1
Repeatability	μm	±0.15	±0.3
Horizontal Straightness	μm	±1.5	±2.5
Vertical Straightness	μm	±1.5	±2.5
Rated Payload [4]	kg	45.0	
No-load Moving Mass	kg	7.3	
No-load Total Mass	kg	13.3	
Max. Static Moment [4]	Nm	24.0	

[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
Abbreviations: NC=Natural Cooling, AC=Air Cooling, WC=Water Cooling.

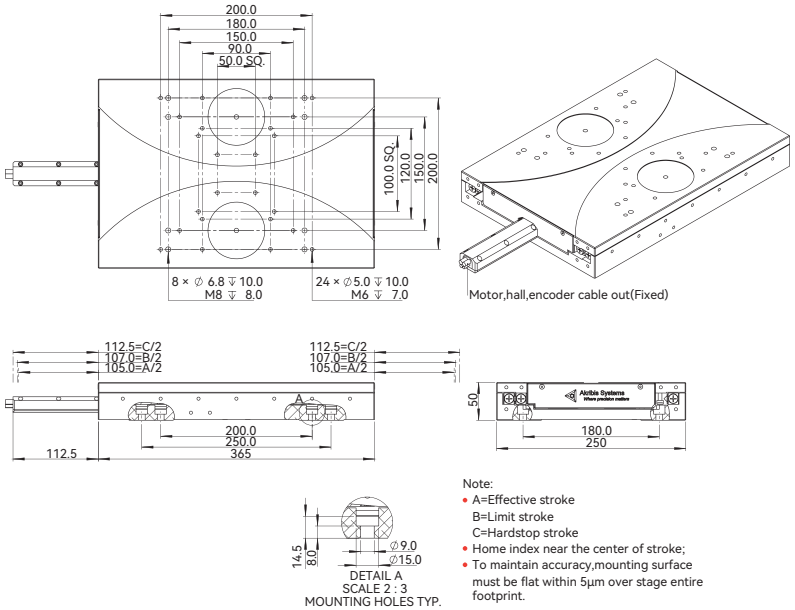
[2] Resistance is measured by DC current with standard 0.5m cable.

[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

Ordering Part Number (OPN)

XRL250-T03-U06R2H1-D1

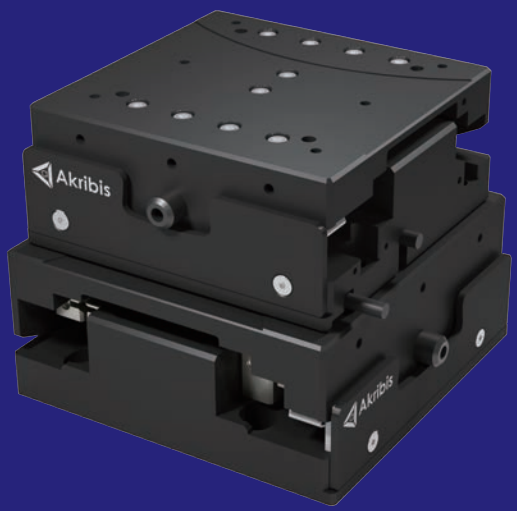
- Model: XRL250
- Precision Grade: Unmarked: Normal
- Cover Type: T: Standard (Black Anodized)
- Effective Stroke: 03: 35mm; 06: 60mm; 11: 110mm; 16: 160mm; 21: 210mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9; 2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9
- Cable Length: D: 1.0m
- Scale Type: 1: Steel Tape, 11ppm/K
- Encoder Type: R2H: Quantic, TTL (0.1μm)
- Motor Type: U06: AUM2-S-S4-K (Peak Force: 176.0N)

XRL250P-T03-U06R4A1-D1

- Model: XRL250
- Precision Grade: P: Precision
- Cover Type: T: Standard (Black Anodized)
- Effective Stroke: 03: 35mm; 06: 60mm; 11: 110mm; 16: 160mm; 21: 210mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15/Hall: DSUB 9; 2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall: DSUB 9
- Cable Length: D: 1.0m
- Scale Type: 1: Steel Tape, 11ppm/K
- Encoder Type: R4A: TONiC, SINCOS (1Vpp)
- Motor Type: U06: AUM2-S-S4-K (Peak Force: 176.0N)

Note:

★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.



XRG SERIES GONIO MODULE

- Compact design
- Anti-creep cross roller guide rail
- Direct drive technology
- Highly dynamic
- High precision optical encoder
- Stackable configuration

EN-25.5.1

Introduction

The XRG series miniature direct drive goniometer stage feature anti-creep crossed roller gonio ways. This direct drive module achieves superior dynamic & reliability compared to conventional indirect drive gonio stage.

There are two standard products: XRG70 and XRG110.

Continuous Torque Tcn = 0.602Nm~1.070Nm
Peak Torque Tpk = 1.697Nm~3.210Nm

Features

- Compact design, direct-drive goniometer positioning stage
- 12.0 degree stroke
- Built-in grating scale and repeatability up to 4.0 arcsec
- It can be combined flexibly with XRG70-XRG110 to form pitch-roll positioning stage with intercepting axis of rotation or combined with AMR/AML/AMZ to form a 6-axis positioning stage

Applications

Suitable for high precision Angle positioning, optical alignment stage.

Applicable to point-to-point high-speed angular component positioning, optical alignment, optical focusing, flying probe test, fibre optic alignment and assembly for automation equipment of all industry.

Cross Roller Modules Series	Continuous Torque (T_{cn}) / Peak Torque (T_{pk}) Unit: Nm 1.0 / 1.5 / 2.0 / 2.5 / 3.0 / 3.5	Stroke[1] (degree)	Repeatability (arcsec)	Page
 XRG70	0.602 / 1.697	12.0	up to 4.0	090
 XRG110	1.070 / 3.210	12.0		091

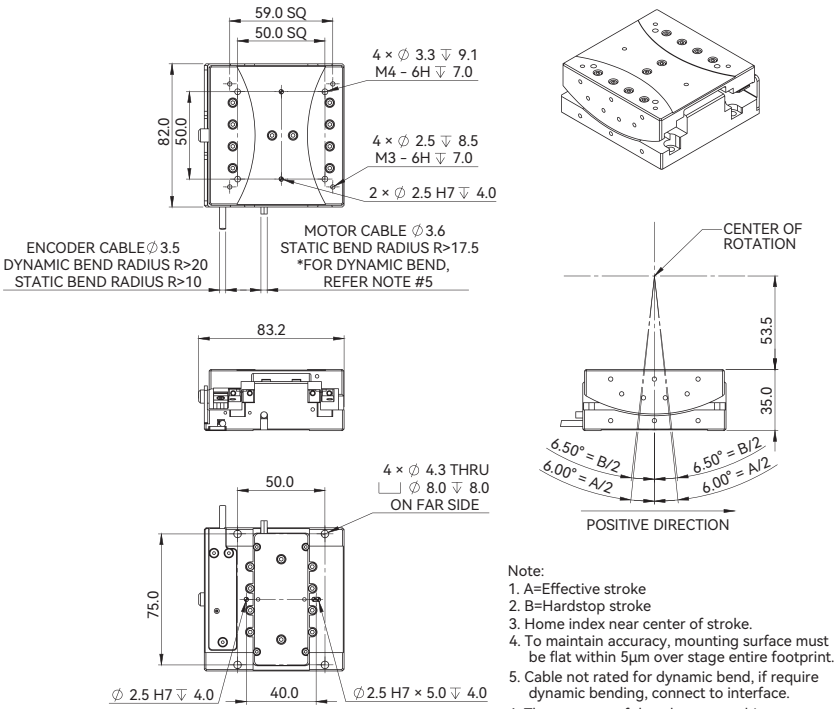
Note:
[1] Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

XRG70

Motor Specifications	Unit	Value
Motor	-	CLC0012
Continuous Torque @100°C ❶	Nm	0.602
Peak Torque	Nm	1.697
Torque Constant ±10%	Nm/Arms	0.602
Back EMF Constant ±10%	Vpeak/rpm	0.051
Motor Constant @25°C	Nm/Sqrt(W)	0.169
Resistance (L-L) @25°C ±10% ❷	Ω	8.500
Inductance (L-L) ±20% ❸	mH	8.300
Continuous Current @100°C ❶	Arms	1.00
Peak Current	Arms	3.00
Max. Bus Voltage	Vdc	48
Mechanical Specifications	**Unit**	**Value**
Effective stroke	degree	12.0
Resolution	-	SINCOS
Repeatability	arcsec	4.0
Max. Velocity	degree/s	150.0
Radius of Rotation	mm	70.0
Height from Mounting Surface to Center of Rotation	mm	53.5
Rated Payload ❹	kg	1.10
No-load Moving Mass	kg	0.23
No-load Total Mass	kg	0.65
Max. Static Moment	Nm	3.82

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m cable.
❸ Inductance is measured by current frequency of 1kHz.
❹ Load capacity of module without cantilever.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



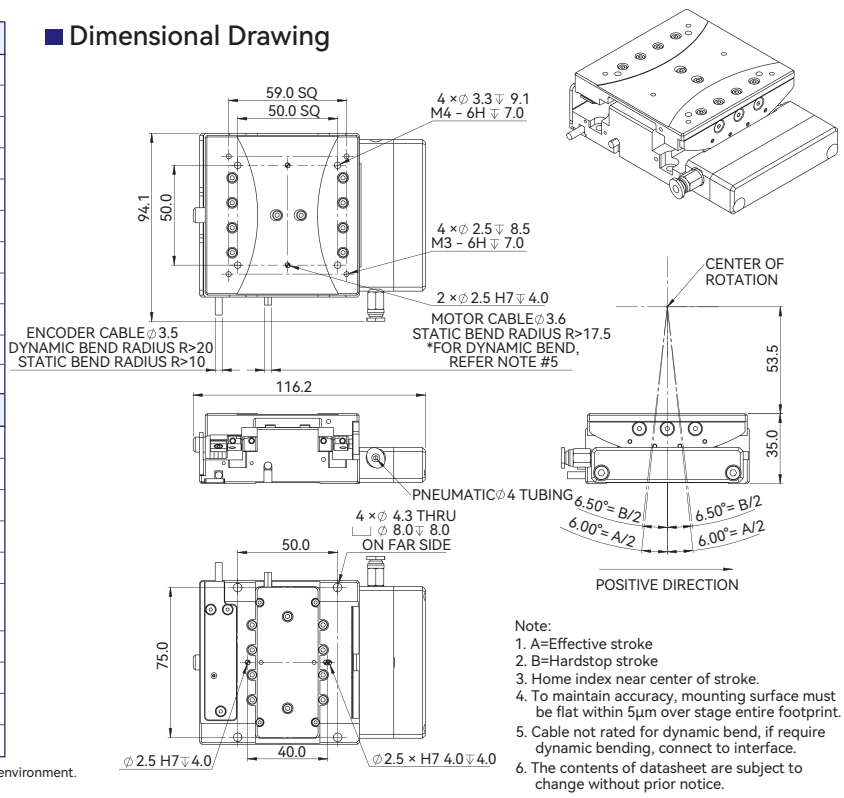
Note:
1. A=Effective stroke
2. B=Hardstop stroke
3. Home index near center of stroke.
4. To maintain accuracy, mounting surface must be flat within 5μm over stage entire footprint.
5. Cable not rated for dynamic bend, if require dynamic bending, connect to interface.
6. The contents of datasheet are subject to change without prior notice.

XRG70 (With Brake Function)

Motor Specifications	Unit	Value
Motor	-	CLC0012
Continuous Torque @100°C ❶	Nm	0.602
Peak Torque	Nm	1.697
Torque Constant ±10%	Nm/Arms	0.602
Back EMF Constant ±10%	Vpeak/rpm	0.051
Motor Constant @25°C	Nm/Sqrt(W)	0.169
Resistance (L-L) @25°C ±10% ❷	Ω	8.500
Inductance (L-L) ±20% ❸	mH	8.300
Continuous Current @100°C ❶	Arms	1.00
Peak Current	Arms	3.00
Max. Bus Voltage	Vdc	48
Mechanical Specifications	**Unit**	**Value**
Effective stroke	degree	12.0
Resolution	-	SINCOS
Repeatability	arcsec	4.0
Max. Velocity	degree/s	150.0
Radius of Rotation	mm	70.0
Height from Mounting Surface to Center of Rotation	mm	53.5
Rated Payload ❹	kg	1.10
No-load Moving Mass	kg	0.23
No-load Total Mass	kg	0.65
Max. Static Moment	Nm	3.82

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m cable.
❸ Inductance is measured by current frequency of 1kHz.
❹ Load capacity of module without cantilever.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



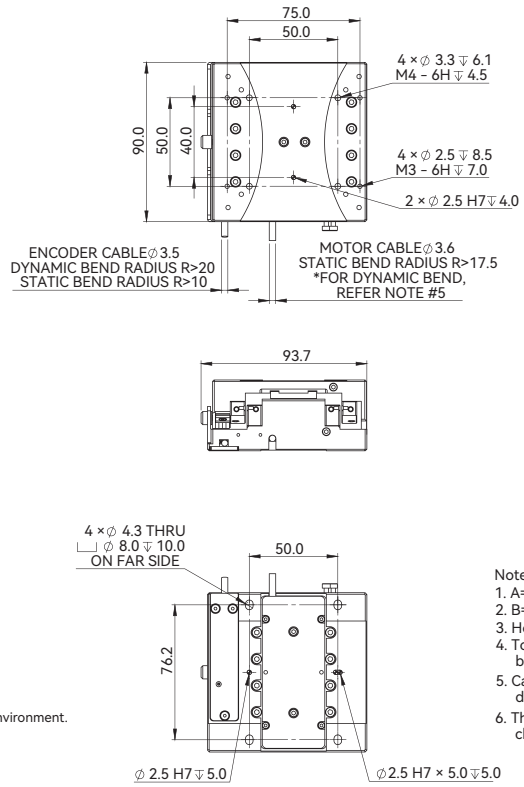
Note:
1. A=Effective stroke
2. B=Hardstop stroke
3. Home index near center of stroke.
4. To maintain accuracy, mounting surface must be flat within 5μm over stage entire footprint.
5. Cable not rated for dynamic bend, if require dynamic bending, connect to interface.
6. The contents of datasheet are subject to change without prior notice.
7. Apply 0.3MPa to release brake (no payload condition).

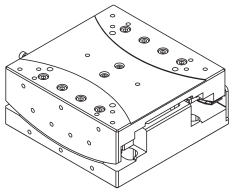
XRG110

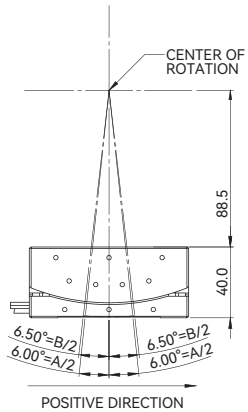
Motor Specifications	Unit	Value
Motor	-	CLC0013
Continuous Torque @100°C ❶	Nm	1.070
Peak Torque	Nm	3.210
Torque Constant ±10%	Nm/Arms	1.070
Back EMF Constant ±10%	Vpeak/rpm	0.090
Motor Constant @25°C	Nm/Sqrt(W)	0.440
Resistance (L-L) @25°C ±10% ❷	Ω	3.900
Inductance (L-L) ±20% ❸	mH	5.000
Continuous Current @100°C ❶	Arms	1.00
Peak Current	Arms	3.00
Max. Bus Voltage	Vdc	48
Mechanical Specifications	**Unit**	**Value**
Effective stroke	degree	12.0
Resolution	-	SINCOS
Repeatability	arcsec	4.0
Max. Velocity	degree/s	150.0
Radius of Rotation	mm	110.0
Height from Mounting Surface to Center of Rotation	mm	88.5
Rated Payload ❹	kg	1.70
No-load Moving Mass	kg	0.41
No-load Total Mass	kg	1.10
Max. Static Moment	Nm	8.99

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m cable.
❸ Inductance is measured by current frequency of 1kHz.
❹ Load capacity of module without cantilever.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing







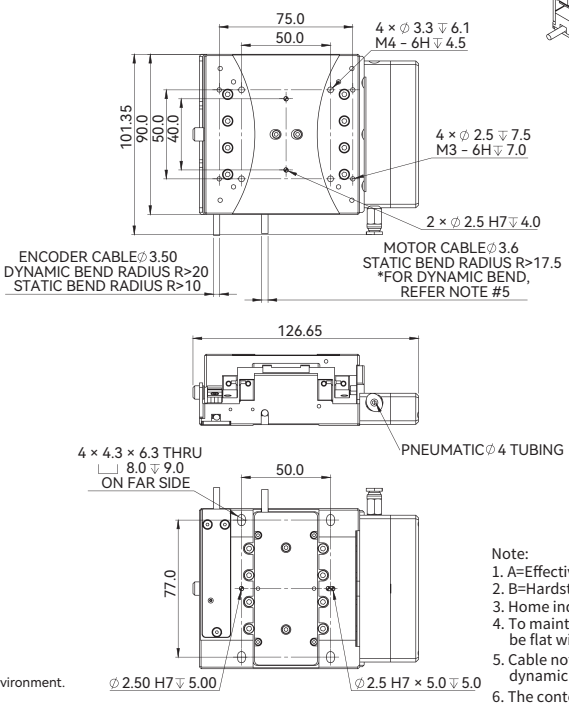
Note:
1. A=Effective stroke
2. B=Hardstop stroke
3. Home index near center of stroke.
4. To maintain accuracy, mounting surface must be flat within 5µm over stage entire footprint.
5. Cable not rated for dynamic bend, if require dynamic bending, connect to interface.
6. The contents of datasheet are subject to change without prior notice.

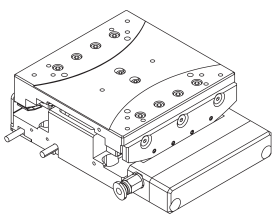
XRG110 (With Brake Function)

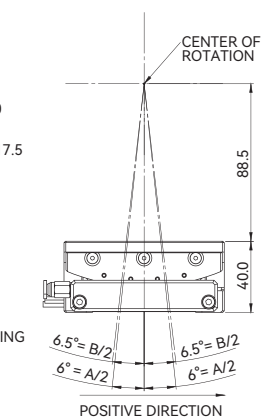
Motor Specifications	Unit	Value
Motor	-	CLC0013
Continuous Torque @100°C ❶	Nm	1.070
Peak Torque	Nm	3.210
Torque Constant ±10%	Nm/Arms	1.070
Back EMF Constant ±10%	Vpeak/rpm	0.090
Motor Constant @25°C	Nm/Sqrt(W)	0.440
Resistance (L-L) @25°C ±10% ❷	Ω	3.900
Inductance (L-L) ±20% ❸	mH	5.000
Continuous Current @100°C ❶	Arms	1.00
Peak Current	Arms	3.00
Max. Bus Voltage	Vdc	48
Mechanical Specifications	**Unit**	**Value**
Effective stroke	degree	12.0
Resolution	-	SINCOS
Repeatability	arcsec	4.0
Max. Velocity	degree/s	150.0
Radius of Rotation	mm	110.0
Height from Mounting Surface to Center of Rotation	mm	88.5
Rated Payload ❹	kg	1.70
No-load Moving Mass	kg	0.41
No-load Total Mass	kg	1.10
Max. Static Moment	Nm	8.99

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m cable.
❸ Inductance is measured by current frequency of 1kHz.
❹ Load capacity of module without cantilever.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing







Note:
1. A=Effective stroke
2. B=Hardstop stroke
3. Home index near center of stroke.
4. To maintain accuracy, mounting surface must be flat within 5µm over stage entire footprint.
5. Cable not rated for dynamic bend, if require dynamic bending, connect to interface.
6. The contents of datasheet are subject to change without prior notice.
7. Apply 0.3MPa to release brake (no payload condition).

Ordering Part Number (OPN)

XRG70-B-T12-R1A1-A1

Model:
XRG70
XRG110

Brake Function:
Unmarked: Blank
B: With Brake Function

Cover Type:
T: Standard (Black Anodized)

Effective Stroke:
12: 12deg

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15
2: Motor: TYCO4/Encoder: DSUB 15

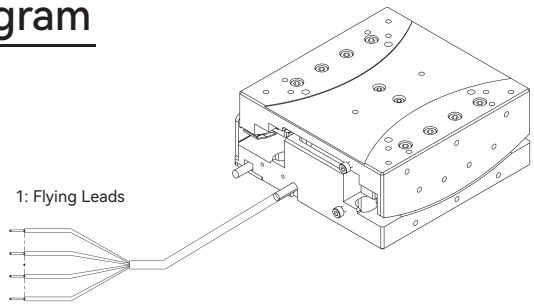
Cable Length:
A: 0.5m
D: 1.0m
B: 3.0m

Scale Type:
1: Steel tape, 11ppm/K

Encoder Type:
R1A: ATOM4, SINCOS (1Vpp)

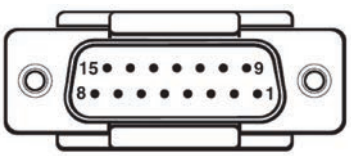
XRG Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
1	M1	Black
2	M2	Red
3	M3	Blue
4	PE	Green



2: TYCO4 Connector

XRG Encoder Cable Connection Diagram



Ri Connector

ENCODER CONNECTOR	PIN	SIGNAL		FUNCTION
	4, 5	5V		POWER
	12, 13	0V		
	9	V1	+	INCREMENTAL SIGNALS
	1		-	
	10	V2	+	
	2		-	
	3	V0	+	REFERENCE MARK
	11		-	
	-	-	-	ALARM
	6	VX		SET-UP
	14	CAL		REMOTE CAL
	Case	-		SHIELD
	7, 8, 15	-		DO NOT CONNECT

VOICE COIL MODULES

VOICE COIL MODULES

Overview

Akribis voice coil modules consists of voice coil motor, high precision guide rail, position feedback encoder, and customized parts, which are assembled as a compact structure, to give a high-performance direct drive motion platform.

There is a variety of standard products to select from: XMGV, XCV, TGV, MBV and XRV which are in the form of cylindrical module.

Amongst them, each series of the standard modules uses Akribis high performance standard cylindrical and square voice coil motors which have the characteristics of high precision, fast response, high rigidity, high stability, maintenance free and high cost efficiency. It is suitable for optical focusing, high frequency, force control and high frequency pick-and-place conditions.

Voice Coil Modules

XMGV Series

- Direct drive, Built-in cylindrical voice coil motor
- Stroke from 15mm to 30mm
- No cogging effect, no backlash, highly responsive and high bandwidth
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- High dynamic performance

▶ Applicable to:
- Operations that requires high response, high precision positioning, and high precision force control.

★ Applications:
Applications in various industries such as automation equipment which requires point-to-point high speed positioning, z-axis optical focusing, leveling mechanism, high speed pick and place, flying probe test, material fatigue tester and others.

XCV Series

- Direct drive, Built-in cylindrical voice coil motor
- Stroke from 4mm
- No cogging effect, no backlash, highly responsive and high bandwidth
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- High dynamic performance

▶ Applicable to:
- Operations that requires high response, high precision positioning, and high precision force control. The module is small for space constraint applications that are suitable for micro assembly pick up mechanism.

★ Applications:
Applications in various industries such as automation equipment which requires point-to-point high speed positioning, high speed pick and place, flying probe test, material fatigue tester and others.

TGV Series

- Direct drive, Built-in cylindrical voice coil motor
- Stroke from 10mm to 30mm
- No cogging effect, no backlash, highly responsive and high bandwidth
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- High dynamic performance

▶ Applicable to:
- Operations that requires high response, high precision positioning, and high precision force control. The module is small for space constraint applications that are suitable for micro assembly pick up mechanism.

★ Applications:
Applications in various industries such as automation equipment which requires point-to-point high speed positioning, high speed pick and place, flying probe test and others.

MBV Series

- Direct drive, Built-in cylindrical voice coil motor
- Stroke from 6mm and 8mm
- Optional resolution of 0.2μm, 0.05μm, 1μm
- Suitable for vertical orientation, built-in spring counterweight
- High cost performance

▶ Applicable to:
- Vertical direction high-speed pick-and-place and force control for special requirements such as limited structural size/dimension constraint.

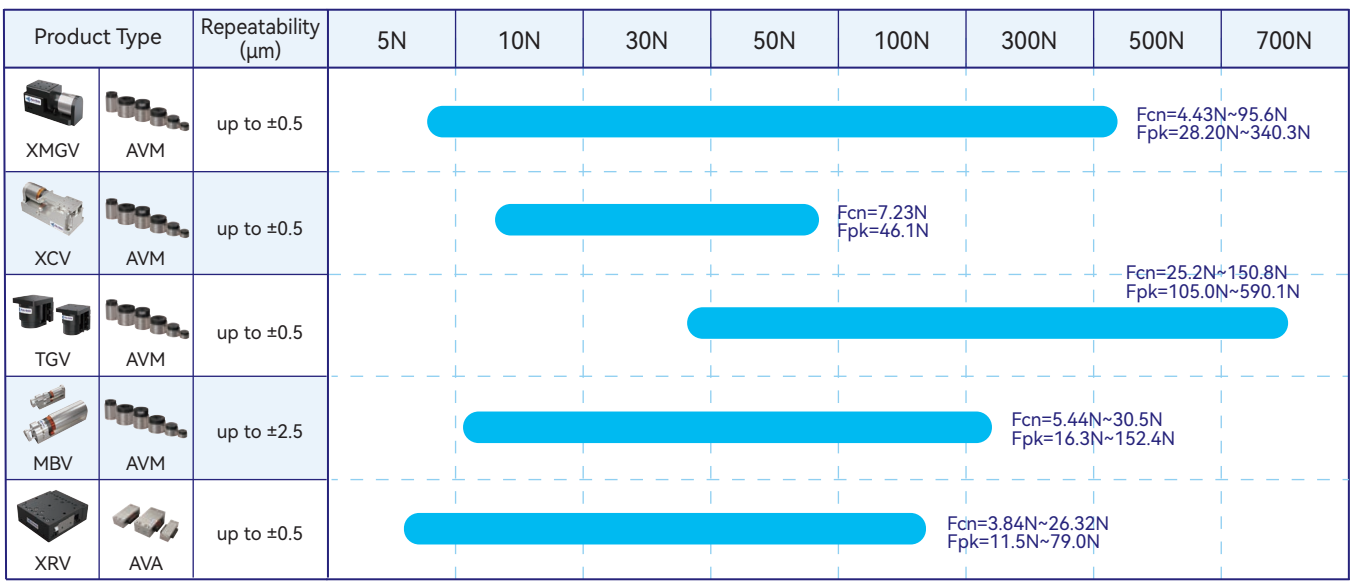
★ Applications:
Automation equipment in various industries, light load point-to-point high-speed positioning, high-speed pick-and-place, precision assembly etc.

XRV Series

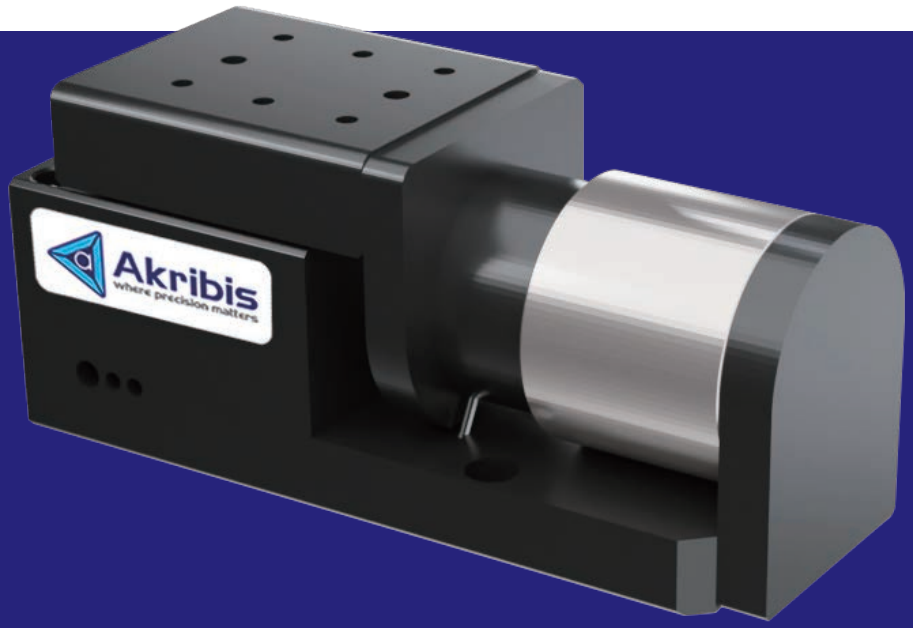
- Direct drive with cylinder shape voice motor voice coil motor
- Direct drive, zero cogging forces
- Stroke from 20mm
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- High dynamic performance

▶ Applicable to:
- Operations that requires high response, high precision positioning, and high precision force control.

★ Applications:
Applicable to different industries and applications, point-to-point high-speed positioning, optical focus, leveling mechanism, high speed pick and place, flying probe test and fatigue testing machine.



Applications: Used in electrical and semiconductor manufacturing, solar PV and lithium battery manufacturing equipment, LCD display, hard disc, PCB, high precision manufacturing, CNC, automotive electronics, packaging, printing, optics and bio-medical industry etc.



XMGV SERIES

- Zero cogging, zero backlash, ironless linear positioning module
- Stroke from 15mm to 30mm
- Suitable for high speed and high acceleration application
- Smooth motion even at low speed (minimum velocity ripple)
- Uses cross roller guide for high stiffness

EN-25.5.1

XMGV Series

Introduction

The XMGV series linear modules combines cylindrical voice coil motors, precision crossed roller ways, and linear encoder feedback to realized high performance direct-drive motion in a compact package.

The product comes in four standard sizes: XMGV30, XMGV40, XMGV60, and XMGV90 to cater to a wide range of payloads. Two different precision grades (corresponding to different bearing and feedback options) provide additional flexibility to tailor the product to your application.

The built-in voice coil motor provides smooth, cogging-free actuation, while the crossed roller ways eliminate bearing reentry noise to enable accurate tracking of low velocities.

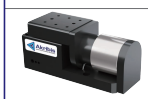
Continuous Force F_{cn} = 4.43N~95.6N
Peak Force F_{pk} = 28.20N~340.3N

Features

- Direct drive, built-in cylindrical voice coil motor
- Stroke from 15mm to 30mm
- Repeatability up to ±0.5μm
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- Excellent straightness and flatness, high rigidity, high dynamic performance

Applications

Applications in various industries such as automation equipment which requires point-to-point high speed positioning, z-axis optical focusing, leveling mechanism, high speed pick and place, flying probe test, material fatigue tester and others.

Voice Coil Module Series	Voice Coil Motor Series		Continuous Force (F_{cn}) ■ Peak Force (F_{pk}) Unit: N 5 / 10 / 50 / 100 / 300 / 500	Stroke (mm)	Repeatability (μm)	Page
 XMGV30	 AVM30	AVM30-15	4.43 — 28.20	15	up to ±0.5	097
 XMGV40	 AVM40	AVM40-20	10.5 — 61.7	20		097
 XMGV60	 AVM60	AVM60-25	26.8 — 121.6	25		098
 XMGV90	 AVM90	AVM90-30	95.6 — 340.3	30		098

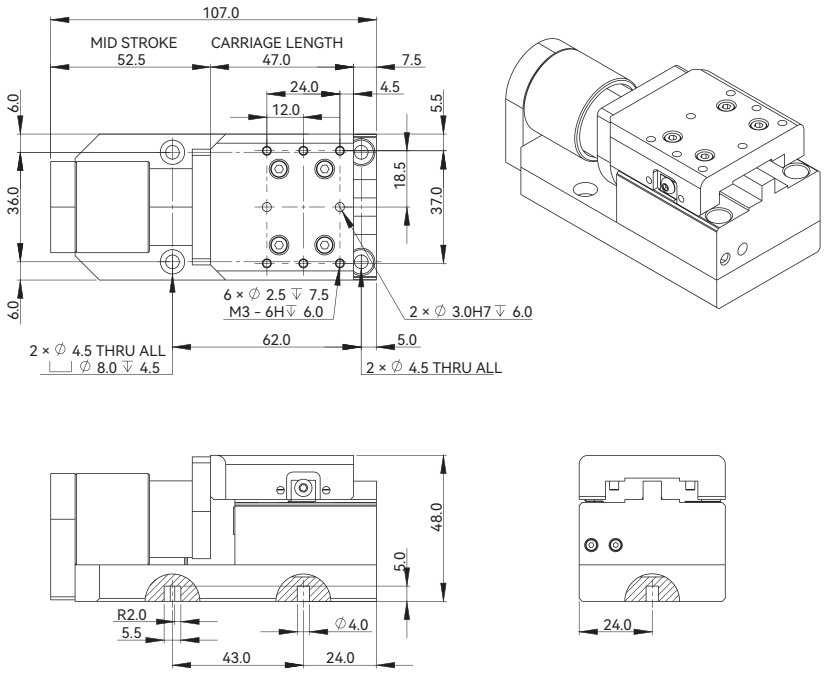
Note:
★ Products can be customized to meet specific working environments or for high frequency reciprocating motion, please contact cust-service@akribis-sys.com.

XMGV30

Motor Specifications	Unit	Value	
Motor	-	AVM30-15	
Continuous Force (NC) @100℃ [1][2]	N	4.43	
Peak Force [2]	N	28.2	
Force Constant ±10% [2]	N/A	7.03	
Back EMF Constant ±10% [2]	V/(m/s)	7.03	
Resistance @25℃ ±10% [3]	Ω	10.24	
Inductance ±20% [4]	mH	2.82	
Continuous Current (NC) @100℃ [1]	A	0.6	
Peak Current	A	4.0	
Max. Voltage	Vdc	60	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Stroke [5]	mm	15	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.5	±1.0
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload [6]	kg	0.6	
No-load Moving Mass	kg	0.14	
No-load Total Mass	kg	0.51	
Max. Static Moment	Nm	0.8	

[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
[5] Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
[6] The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

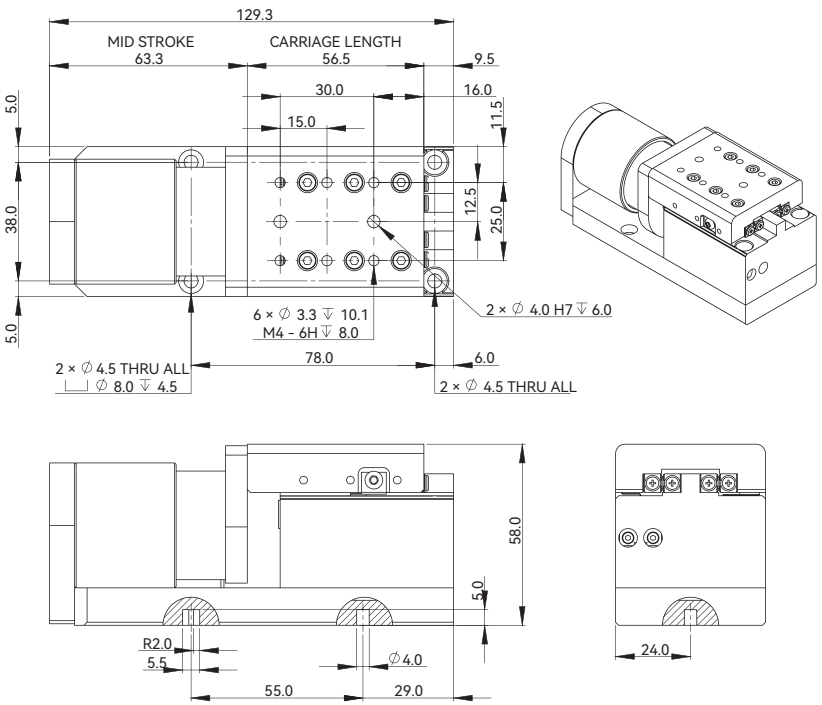


XMGV40

Motor Specifications	Unit	Value	
Motor	-	AVM40-20	
Continuous Force (NC) @100℃ [1][2]	N	10.5	
Peak Force [2]	N	61.7	
Force Constant ±10% [2]	N/A	13.6	
Back EMF Constant ±10% [2]	V/(m/s)	13.6	
Resistance @25℃ ±10% [3]	Ω	11.5	
Inductance ±20% [4]	mH	5.2	
Continuous Current (NC) @100℃ [1]	A	0.8	
Peak Current	A	4.5	
Max. Voltage	Vdc	60	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Stroke [5]	mm	20	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.5	±1.0
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload [6]	kg	1.5	
No-load Moving Mass	kg	0.20	
No-load Total Mass	kg	0.80	
Max. Static Moment	Nm	1.4	

[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
[5] Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
[6] The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

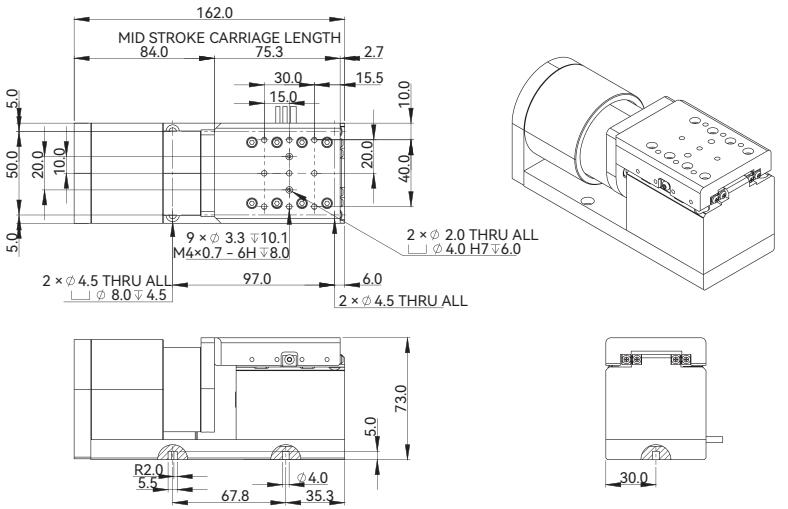


XMGV60

Motor Specifications	Unit	Value	
Motor	-	AVM60-25	
Continuous Force (NC) @100℃ ❶❷	N	26.8	
Peak Force ❷	N	121.6	
Force Constant ±10% ❷	N/A	17.3	
Back EMF Constant ±10% ❷	V/(m/s)	17.3	
Resistance @25℃ ±10% ❸	Ω	5.35	
Inductance ±20% ❹	mH	3.82	
Continuous Current (NC) @100℃ ❶	A	1.6	
Peak Current	A	7.0	
Max. Voltage	Vdc	60	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Stroke ❺	mm	25	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.5	±1.0
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload ❻	kg	4.0	
No-load Moving Mass	kg	0.45	
No-load Total Mass	kg	1.90	
Max. Static Moment	Nm	3.4	

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
❻ The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

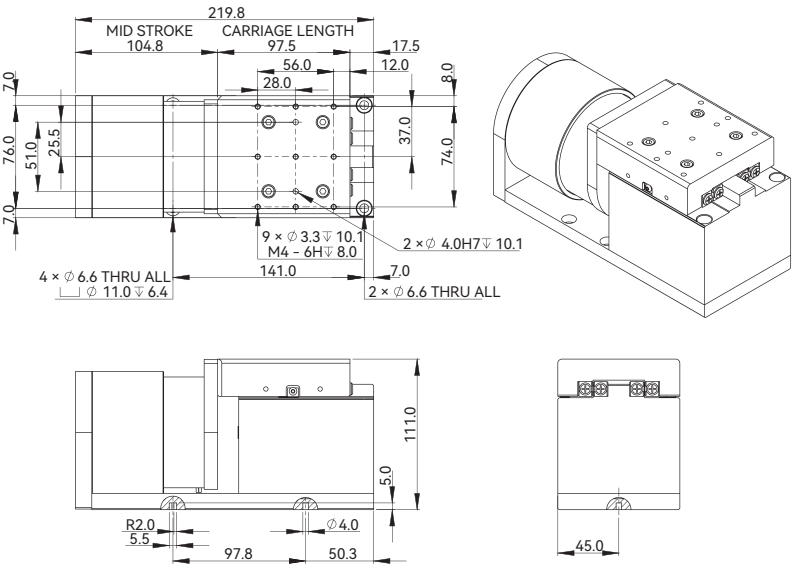


XMGV90

Motor Specifications	Unit	Value	
Motor	-	AVM90-30	
Continuous Force (NC) @100℃ ❶❷	N	95.6	
Peak Force ❷	N	340.3	
Force Constant ±10% ❷	N/A	23.9	
Back EMF Constant ±10% ❷	V/(m/s)	23.9	
Resistance @25℃ ±10% ❸	Ω	2.73	
Inductance ±20% ❹	mH	3.80	
Continuous Current (NC) @100℃ ❶	A	4.0	
Peak Current	A	14.0	
Max. Voltage	Vdc	120	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Stroke ❺	mm	30	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.5	±1.0
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload ❻	kg	14.0	
No-load Moving Mass	kg	1.63	
No-load Total Mass	kg	5.31	
Max. Static Moment	Nm	16.0	

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
❻ The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Ordering Part Number (OPN)

XMGV30-T15-A0G4-A1

Model:
XMGV30
XMGV40
XMGV60
XMGV90

Precision Grade:
Unmarked: Normal

Cover Type:
T: Standard (Black Anodized)

Stroke (Corresponding Models):
15: 15mm (XMGV30)
20: 20mm (XMGV40)
25: 25mm (XMGV60)
30: 30mm (XMGV90)

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15

Cable Length:
A: 0.5m

Scale Type:
4: Nickel, 14ppm/K

Encoder Type:
A0G: ABI-21 (0.2μm)

XMGV30P-T15-R0A2-A1

Model:
XMGV30
XMGV40
XMGV60
XMGV90

Precision Grade:
P: Precision

Cover Type:
T: Standard (Black Anodized)

Stroke (Corresponding Models):
15: 15mm (XMGV30)
20: 20mm (XMGV40)
25: 25mm (XMGV60)
30: 30mm (XMGV90)

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15

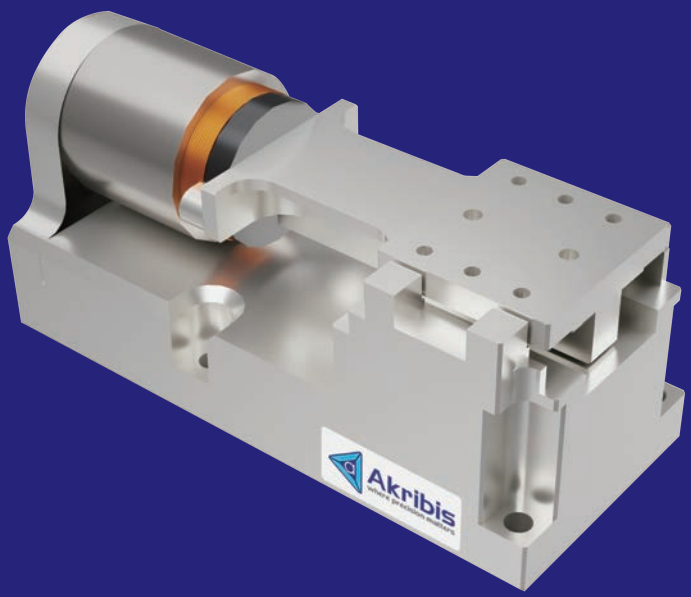
Cable Length:
A: 0.5m

Scale Type:
2: Glass G8 Soda Lime, 8ppm/K

Encoder Type:
R0A: ATOM2, SINCOS (1Vpp)
R0J: ATOM2, TTL (0.05μm)

Note:

★ Products can be customized to meet specific working environments or for high frequency reciprocating motion, please contact cust-service@akribis-sys.com.



XCV SERIES

- Direct drive linear mechanism by voice coil motor
- Zero cogging effect, zero backlash
- High repeatability and accuracy
- Suitable for short stroke, high speed and high acceleration application
- Cross roller stage providing high stiffness
- Maximized dynamic performance

Introduction

XCV series voice coil module consists of cylindrical voice coil motor, cross roller bearing system， encoder position feedback system, and customized parts which are assembled as a compact structure, to give a high-performance direct drive motion platform.

The built-in voice coil motor and encoder position feedback of the standard module XCV30 can be selected according to the actual technical requirements. Customization service is available.

XCV modules have the following characteristics, no cogging force, low friction because of the use of cross roller bearings. Suitable for short stroke, high speed and high acceleration applications.

Continuous Force F_{cn} = 7.23N

Peak Force F_{pk} = 46.1N

Features

- Direct drive, built-in cylindrical voice coil motor
- Stroke from 4mm
- No cogging effect, no backlash, highly responsive and high bandwidth
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- Excellent straightness and flatness, high rigidity, high dynamic performance

Applications

Applications in various industries such as automation equipment which requires point-to-point high speed positioning, z-axis optical focusing, leveling mechanism, high speed pick and place, flying probe test, material fatigue tester and others.

Voice Coil Module Series	Voice Coil Motor Series		Continuous Force (F_{cn}) ■ Peak Force (F_{pk}) Unit: N 5 10 20 30 40 50	Stroke (mm)	Repeatability (μm)	Page
 XCV30	 AVM30	AVM30-HF-4	7.23 / 46.1	4	up to ±0.2	102

Note:

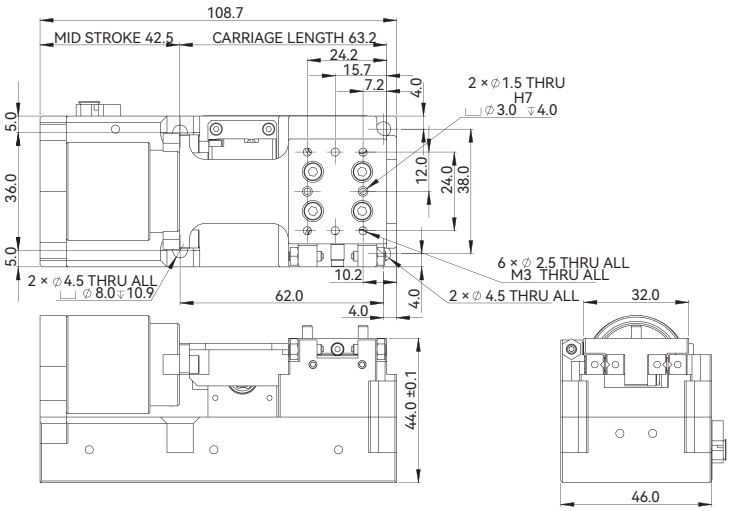
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

XCV30

Motor Specifications	Unit	Value	
Motor	-	AVM30-HF-4	
Continuous Force (NC) @100℃ ❶❷	N	7.23	
Peak Force ❷	N	46.1	
Force Constant ±10% ❷	N/A	11.5	
Back EMF Constant ±10% ❷	V/(m/s)	11.5	
Resistance @25℃ ±10% ❸	Ω	8.0	
Inductance ±20% ❹	mH	1.40	
Continuous Current (NC) @100℃ ❶	A	0.6	
Peak Current	A	4.0	
Max. Voltage	Vdc	60	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Stroke	mm	4	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.2	±0.5
Horizontal Straightness	μm	±0.5	
Vertical Straightness	μm	±0.5	
No-load Moving Mass	kg	0.065	
No-load Total Mass	kg	0.467	
Max. Static Moment	Nm	8.8	

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Ordering Part Number (OPN)

XCV30-T04-A0G4-A1

- Model: XCV30
- Precision Grade: Unmarked: Normal
- Cover Type: T: Standard (Black Anodized)
- Stroke: 04: 4mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15
- Cable Length: A: 0.5m
- Scale Type: 4: Nickel, 14ppm/K
- Encoder Type: A0G: ABI-21, TTL (0.2μm)

XCV30P-T04-R0A2-A1

- Model: XCV30
- Precision Grade: P: Precision
- Cover Type: T: Standard (Black Anodized)
- Stroke: 04: 4mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15
- Cable Length: A: 0.5m
- Scale Type: 2: Glass G8 Soda Lime, 8ppm/K
- Encoder Type: R0A: ATOM2, SINCOS (1Vpp) R0J: ATOM2, TTL (0.05μm)

Note:
★Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

TGV SERIES

- Linear voice coil modules with through holes
- Low friction
- High precision
- Well-suited for optical and vision applications

TGV Series

Introduction

TGV series voice coil module consists of cylindrical voice coil motor, cross roller bearing system， encoder position feedback system, and customized parts which are assembled as a compact structure, to give a high-performance direct drive motion platform. A sizable central hole provides a clear aperture through the module.

There are four standard products: TGV50, TGV75, TGV90 and TGV130. These can be customized according to the actual technical requirements. The built-in voice coil motor and encoder of the standard modules are optional.

TGV modules have the following characteristics, no cogging force, low friction because of the use of cross roller bearings, precise and highly responsive.

Continuous Force F_{cn} = 25.2N~150.8N
Peak Force F_{pk} = 105.0N~590.1N

Features

- Direct drive, built-in cylindrical voice coil motor
- Large through hole
- Stroke from 10mm to 30mm
- Repeatability up to ±0.5μm
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- Excellent straightness and flatness, high rigidity, high dynamic performance

Applications

Applications in various industries such as automation equipment which requires point-to-point high speed positioning, z-axis optical focusing, leveling mechanism, high speed pick and place, flying probe test, material fatigue tester and others.

Voice Coil Module Series	Voice Coil Motor Series		Continuous Force (F_{cn}) / Peak Force (F_{pk}) Unit: N (30 / 50 / 100 / 300 / 500 / 700)	Stroke (mm)	Repeatability (μm)	Page
 TGV50	 AVM50	AVM50-HF-10-C15	25.2 / 105.0	10	up to ±0.5	105
 TGV75	 AVM75	AVM75-HF-25	127.9 / 590.1	25		105
 TGV90	 AVM90	AVM90-30-C77	57.3 / 202.6	30		106
 TGV130	 AVM130	AVM130-HF-10	150.8 / 452.3	10		106

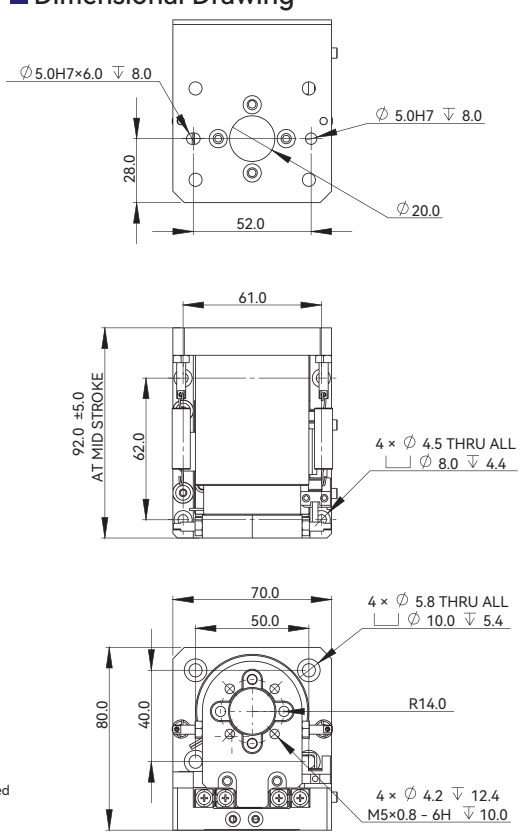
Note:
★ Products can be customized to meet specific working environments or for high frequency reciprocating motion, please contact cust-service@akribis-sys.com.

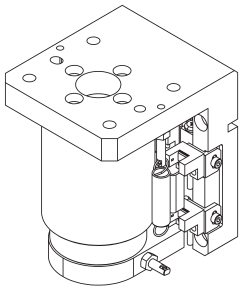
TGV50

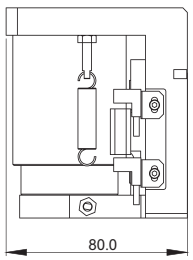
Motor Specifications	Unit	Value
Motor	-	AVM50-HF-10-C15
Continuous Force (NC) @100℃ ❶❷	N	25.2
Peak Force ❷	N	105.0
Force Constant ±10% ❷	N/A	21.0
Back EMF Constant ±10% ❷	V/(m/s)	21.0
Resistance @25℃ ±10% ❸	Ω	8.75
Inductance ±20% ❹	mH	4.93
Continuous Current (NC) @100℃ ❶	A	1.2
Peak Current	A	5.0
Max. Voltage	Vdc	60
Mechanical Specifications	**Unit**	**Value**
Precision Grade	-	P / N
Stroke ❺	mm	10
Resolution	μm	SINCOS/0.05 / 0.2
Repeatability	μm	±0.5 / ±1
Horizontal Straightness	μm	±2.5
Vertical Straightness	μm	±2.5
Rated Payload ❻	kg	3.0
No-load Moving Mass	kg	0.26
No-load Total Mass	kg	1.21
Max. Static Moment	Nm	6.8

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
❻ The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing





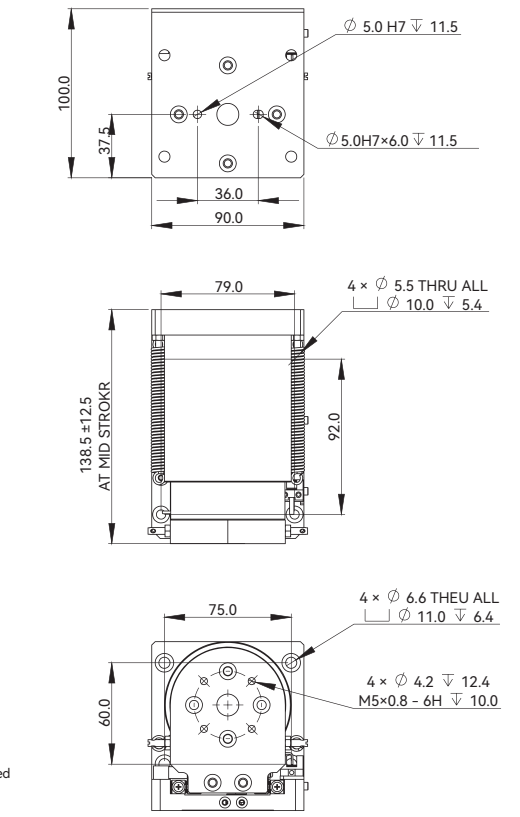


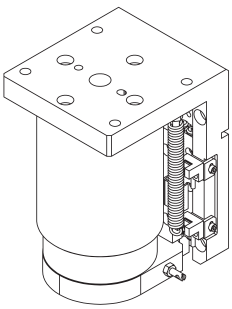
TGV75

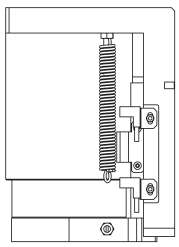
Motor Specifications	Unit	Value
Motor	-	AVM75-HF-25
Continuous Force (NC) @100℃ ❶❷	N	127.9
Peak Force ❷	N	590.1
Force Constant ±10% ❷	N/A	34.6
Back EMF Constant ±10% ❷	V/(m/s)	34.6
Resistance @25℃ ±10% ❸	Ω	2.83
Inductance ±20% ❹	mH	2.76
Continuous Current (NC) @100℃ ❶	A	3.7
Peak Current	A	17.0
Max. Voltage	Vdc	60
Mechanical Specifications	**Unit**	**Value**
Precision Grade	-	P / N
Stroke ❺	mm	25
Resolution	μm	SINCOS/0.05 / 0.2
Repeatability	μm	±0.5 / ±1
Horizontal Straightness	μm	±2.5
Vertical Straightness	μm	±2.5
Rated Payload ❻	kg	8.0
No-load Moving Mass	kg	1.11
No-load Total Mass	kg	3.85
Max. Static Moment	Nm	14.4

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
❻ The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing





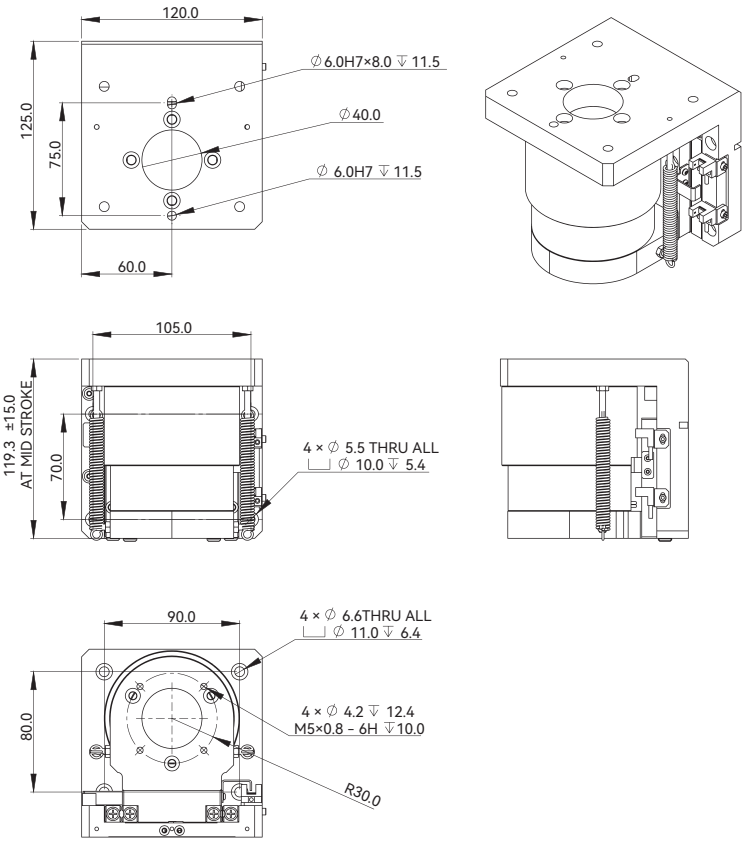


TGV90

Motor Specifications	Unit	Value	
Motor	-	AVM90-30-C77	
Continuous Force (NC) @100℃ ❶❷	N	57.3	
Peak Force ❷	N	202.6	
Force Constant ±10% ❷	N/A	14.33	
Back EMF Constant ±10% ❷	V/(m/s)	14.33	
Resistance @25℃ ±10% ❸	Ω	2.64	
Inductance ±20% ❹	mH	4.09	
Continuous Current (NC) @100℃ ❶	A	4.0	
Peak Current	A	14.0	
Max. Voltage	Vdc	120	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Stroke ❺	mm	30	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.5	±1
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload ❻	kg	6.0	
No-load Moving Mass	kg	1.41	
No-load Total Mass	kg	3.76	
Max. Static Moment	Nm	21.1	

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
❻ The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

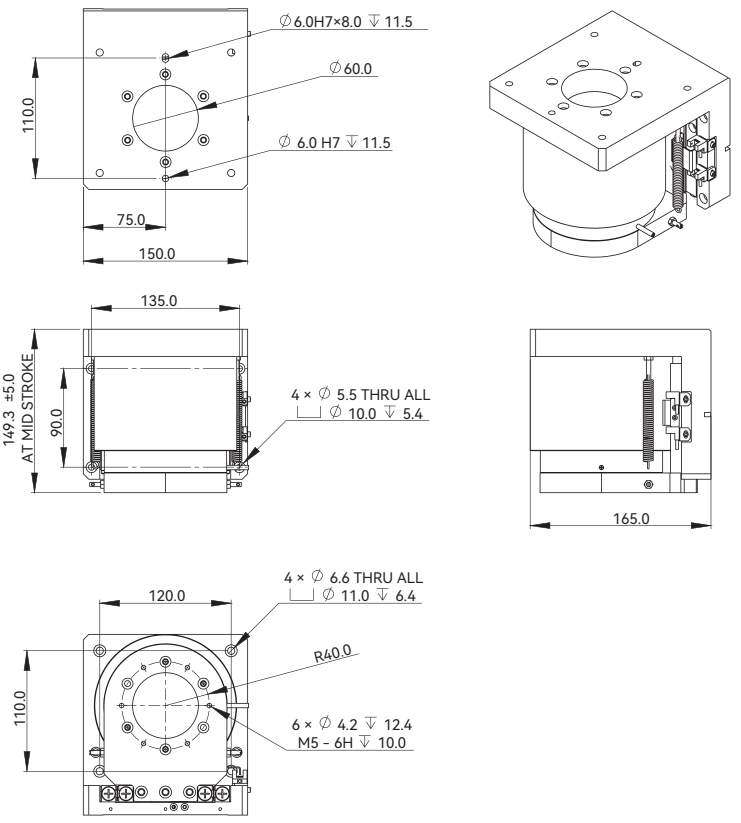


TGV130

Motor Specifications	Unit	Value	
Motor	-	AVM130-HF-10	
Continuous Force (NC) @100℃ ❶❷	N	150.8	
Peak Force ❷	N	452.3	
Force Constant ±10% ❷	N/A	22.8	
Back EMF Constant ±10% ❷	V/(m/s)	22.8	
Resistance @25℃ ±10% ❸	Ω	0.75	
Inductance ±20% ❹	mH	0.75	
Continuous Current (NC) @100℃ ❶	A	6.6	
Peak Current	A	19.8	
Max. Voltage	Vdc	120	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Stroke ❺	mm	10	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.5	±1
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload ❻	kg	15.0	
No-load Moving Mass	kg	2.35	
No-load Total Mass	kg	10.1	
Max. Static Moment	Nm	70.9	

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke. The limit sensors are positioned 0.5mm from the hardstops.
❻ The rated load is based on the load in which the acceleration of the mass is at least 1G.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Ordering Part Number (OPN)

TGV50-T10-A0G4-A1-L1

- Model: TGV50 / TGV75 / TGV90 / TGV130
- Precision Grade: Unmarked: Normal
- Cover Type: T: Standard (Black Anodized)
- Stroke (Corresponding Models): 10: 10mm (TGV50/TGV130); 25: 25mm (TGV75); 30: 30mm (TGV90)
- Encoder Type: A0G: ABI-21, TTL (0.2μm)
- Scale Type: 4: Nickel, 14ppm/K
- Cable Length: A: 0.5m
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15
- Counter Balance[1]: L1 / L2 / L3 / L4

TGV50P-T10-R0A2-A1-L1

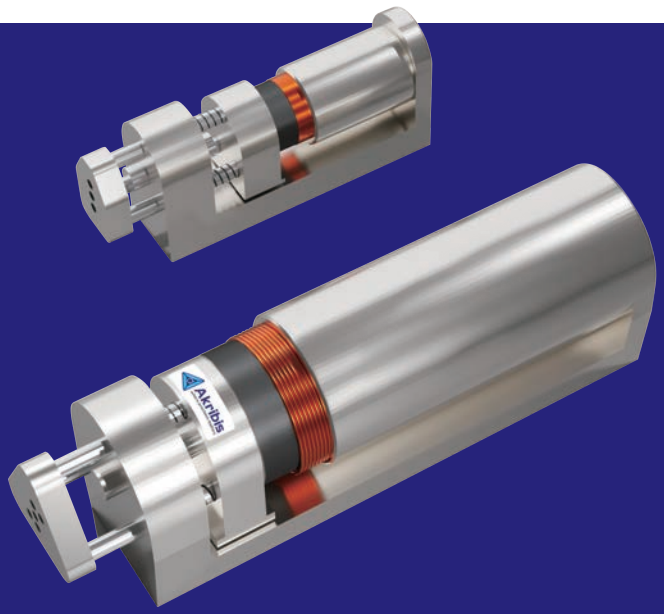
- Model: TGV50 / TGV75 / TGV90 / TGV130
- Precision Grade: P: Precision
- Cover Type: T: Standard (Black Anodized)
- Stroke (Corresponding Models): 10: 10mm (TGV50/TGV130); 25: 25mm (TGV75); 30: 30mm (TGV90)
- Encoder Type: R0A: ATOM2, SINCOS (1Vpp); R0J: ATOM2, TTL (0.05μm)
- Scale Type: 2: Glass G8 Soda Lime, 8ppm/K
- Cable Length: A: 0.5m
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15
- Counter Balance[1]: L1 / L2 / L3 / L4

Payload[1]					
Model	Unit	L1	L2	L3	L4
TGV50-10	g	500	1000	2000	3000
TGV75-25	g	2000	4000	6000	8000
TGV90-30	g	2000	3000	4000	6000
TGV130-10	g	5000	8000	10000	15000

Note:

[1] Counter-balance position is at mid- stroke.

★ Products can be customized to meet specific working environments or for high frequency reciprocating motion, please contact cust-service@akribis-sys.com.



MBV SERIES

- Direct drive linear mechanism by voice coil motor
- Zero cogging effect, zero backlash
- Suitable for short stroke, high speed and high acceleration applications
- For vertical use only

Introduction

The MBV series voice coil motor module consists of a cylindrical voice coil motor, encoder position feedback, bushing guide and structural base; compact and with built-in spring as the counterweight for high-speed movement in the vertical direction.

There are two standard sizes: MBV20 and MVB35, similar configurations are accepted for customization.

Built-in voice coil motor can achieve no cogging force, high response, high frequency and built-in encoder position feedback; the MBV offers superior precision control and fine trajectory control in high-frequency operation compared to the cylinder or electric cylinder construction.

Continuous Force F_{cn} = 5.44N~30.5N

Peak Force F_{pk} = 16.3N~152.4N

Features

- Direct drive, built-in cylindrical voice coil motor
- Stroke from 6mm to 8mm
- Optional resolution of ±50μm
- High responsiveness

Applications

Vertical movement of automation equipment in various industries: high-frequency picking, valve control, handling, material fatigue testing and other applications.

Voice Coil Module Series	Voice Coil Motor Series		Continuous Force (F_{cn}) / Peak Force (F_{pk}) Unit: N 5 / 10 / 30 / 50 / 100 / 300	Stroke (mm)	Repeatability (μm)	Page
 MBV20	 AVM20	AVM20-HF-6	5.44 / 16.3	6	up to ±50	110
 MBV35	 AVM35	AVM35-HF-8	30.5 / 152.4	8		110

Note:

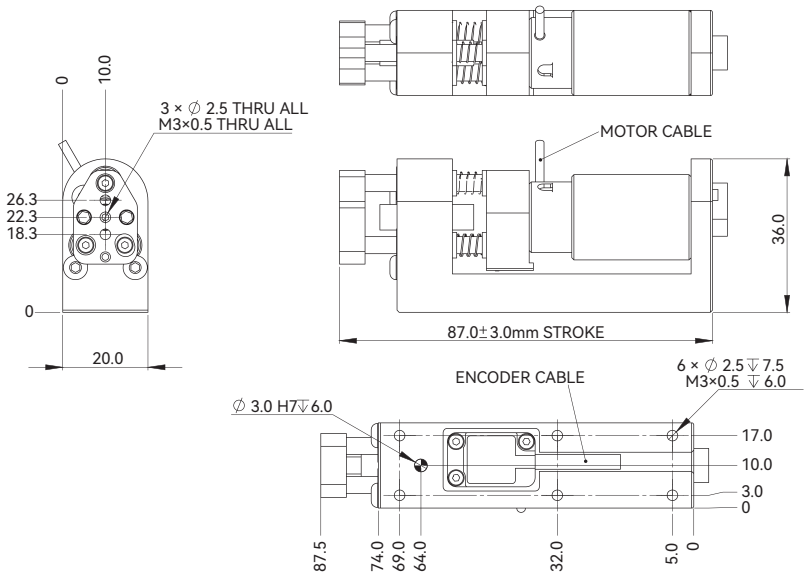
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

MBV20

Motor Specifications	Unit	Value
Motor	-	AVM20-HF-6
Continuous Force (NC) @100℃ ❶❷	N	5.44
Peak Force ❷	N	16.3
Force Constant ±10% ❷	N/A	4.54
Back EMF Constant ±10% ❷	V/(m/s)	4.54
Resistance @25℃ ±10% ❸	Ω	4.84
Inductance ±20% ❹	mH	0.60
Continuous Current (NC) @100℃ ❶	A	1.2
Peak Current	A	3.6
Max. Voltage	Vdc	60
Mechanical Specifications	**Unit**	**Value**
Stroke ❺	mm	6.0
Resolution	μm	ABI21: 1.0/0.5/0.2
Repeatability	μm	±50
No-load Moving Mass	kg	0.035
No-load Total Mass	kg	0.14

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke.
The contents of datasheet are subject to change without prior notice.

■ Dimensional Drawing

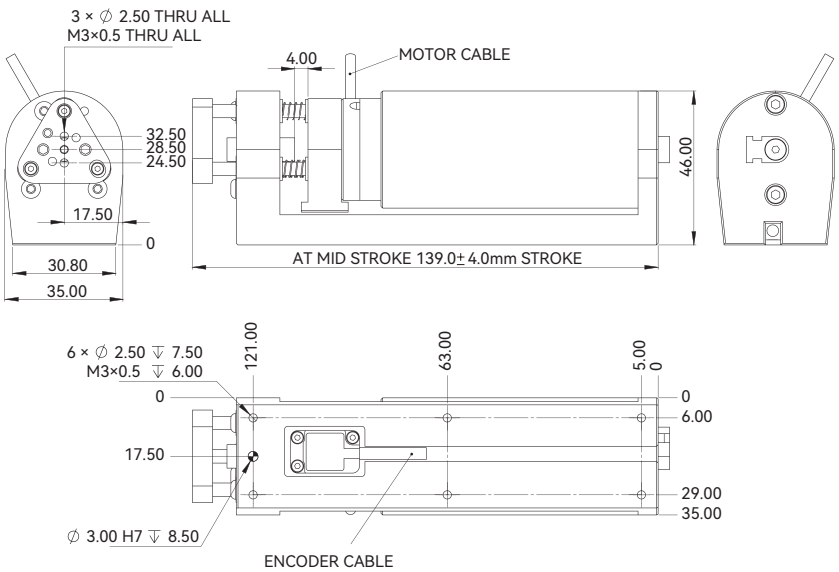


MBV35

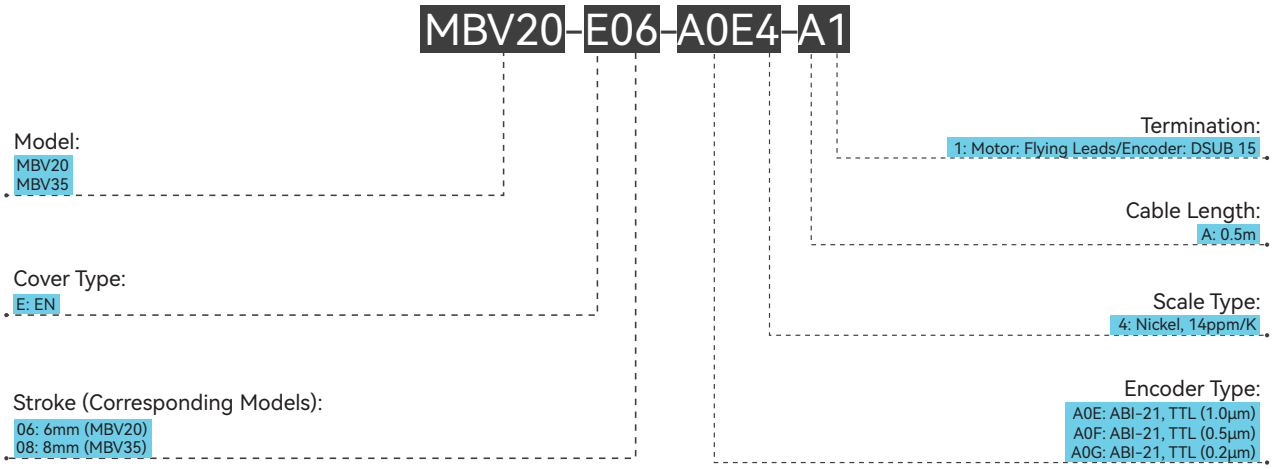
Motor Specifications	Unit	Value
Motor	-	AVM35-HF-8
Continuous Force (NC) @100℃ ❶❷	N	30.5
Peak Force ❷	N	152.4
Force Constant ±10% ❷	N/A	38.1
Back EMF Constant ±10% ❷	V/(m/s)	38.1
Resistance @25℃ ±10% ❸	Ω	17.0
Inductance ±20% ❹	mH	7.15
Continuous Current (NC) @100℃ ❶	A	0.8
Peak Current	A	4.0
Max. Voltage	Vdc	60
Mechanical Specifications	**Unit**	**Value**
Stroke ❺	mm	8.0
Resolution	μm	ABI21: 1.0/0.5/0.2
Repeatability	μm	±50
No-load Moving Mass	kg	0.14
No-load Total Mass	kg	0.65

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
❺ Stroke refers to hardstop-to-hardstop mechanical stroke.
The contents of datasheet are subject to change without prior notice.

■ Dimensional Drawing



Ordering Part Number (OPN)



Note:

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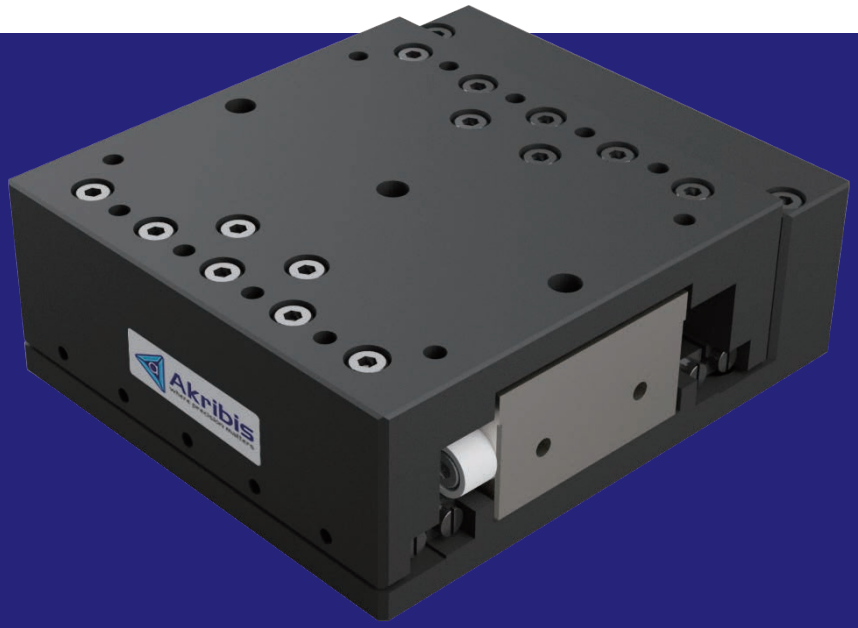


XRV SERIES

- Suitable for micro motion and smooth motion
- Fast response and short settling time
- Low friction
- No commutation needed
- High precision

EN-25.5.1

Introduction

XRV series voice coil motor module is composed of cylindrical voice coil motor, cross roller guide rail, encoder position feedback and structural base. It is a motion platform with compact internal structure and high-performance direct drive.

There are three standard products: XRV76, XRV97 and XRV115. These can be customized according to the actual technical requirements. The built-in voice coil motor and encoder of the standard modules are optional.

XRV modules have the following characteristics, no cogging force, low friction because of the use of cross roller bearings, precise and highly responsive.

Continuous Force F_{cn} = 3.84N~26.32N
Peak Force F_{pk} = 11.5N~79.0N

Features

- Direct drive with cylinder shape voice coil motor, flat structure
- Stroke from 20mm
- Repeatability up to ±0.5m
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- Excellent straightness and flatness, high rigidity, high dynamic performance

Applications

Applications in various industries such as automation equipment which requires point-to-point high speed positioning, z-axis optical focusing, leveling mechanism, high speed pick and place, flying probe test, material fatigue tester and others.

Voice Coil Module Series	Voice Coil Motor Series		Continuous Force (F_{cn}) ■ Peak Force (F_{pk}) Unit:N 4 / 7 / 10 / 40 / 70 / 100	Stroke (mm)	Repeatability (μm)	Page
 XRV76	 AVA1	AVA1-20	3.84 — 11.5	20	up to ±0.5	114
 XRV97	 AVA2	AVA2-20	11.69 — 35.1			114
 XRV115	 AVA3	AVA3-20	26.32 — 79.0			115

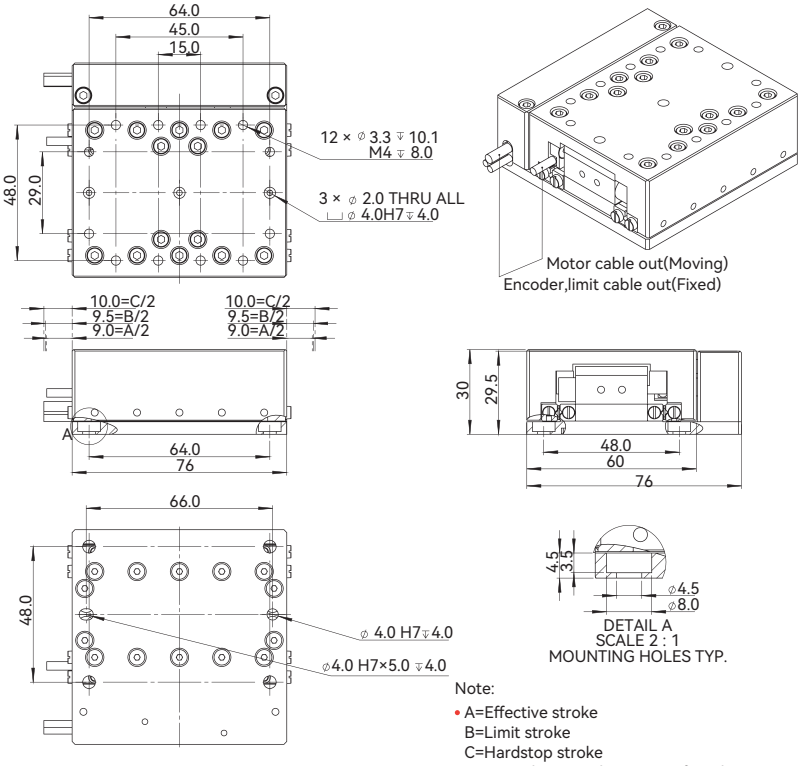
Note:
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

XRV76

Motor Specifications	Unit	Value	
Motor	-	AVA1-20	
Continuous Force (NC) @100℃ ❶❷	N	3.84	
Peak Force ❷	N	11.5	
Force Constant ±10% ❷	N/A	1.92	
Back EMF Constant ±10% ❷	V/(m/s)	1.92	
Resistance (L-L) @25℃ ±10% ❸	Ω	1.40	
Inductance (L-L) ±20% ❹	mH	0.27	
Continuous Current (NC) @100℃ ❶	A	2.0	
Peak Current	A	6.0	
Max. Bus Voltage	Vdc	60	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	20	
Resolution	μm	SINCOS/ 0.05	0.2
Repeatability	μm	±0.5	±1.0
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload	kg	1.0	
No-load Moving Mass	kg	0.2	
No-load Total Mass	kg	0.58	
Max. Static Moment	Nm	0.6	

❶ Measurement is taken at ambient temperature 25℃. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



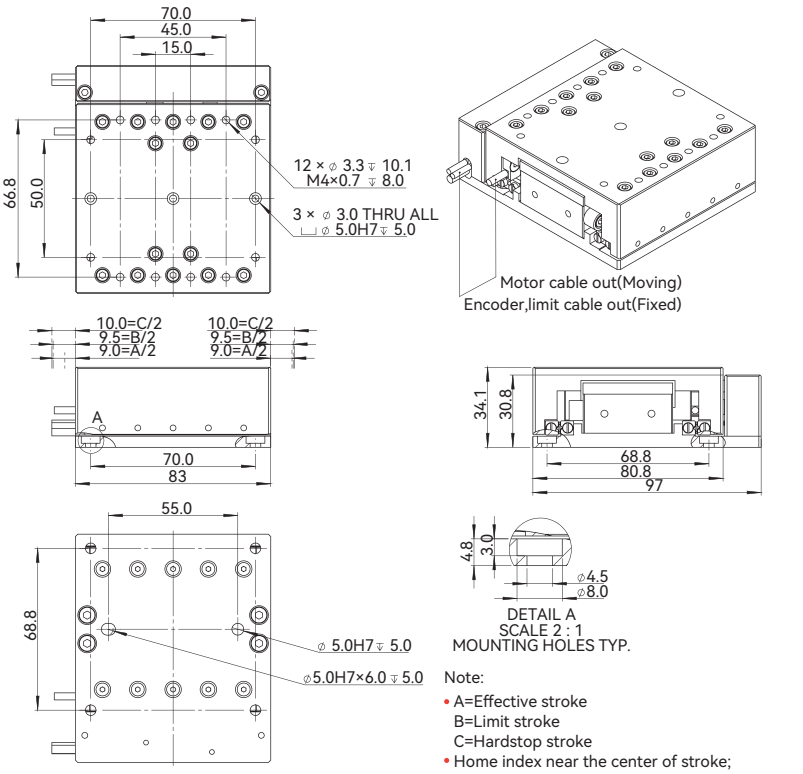
Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- Clearance fit for pin holes;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

XRV97

Motor Specifications	Unit	Value	
Motor	-	AVA2-20	
Continuous Force (NC) @100℃ ❶❷	N	11.69	
Peak Force ❷	N	35.1	
Force Constant ±10% ❷	N/A	8.35	
Back EMF Constant ±10% ❷	V/(m/s)	8.35	
Resistance (L-L) @25℃ ±10% ❸	Ω	3.7	
Inductance (L-L) ±20% ❹	mH	1.24	
Continuous Current (NC) @100℃ ❶	A	1.4	
Peak Current	A	4.2	
Max. Bus Voltage	Vdc	60	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	20	
Resolution	μm	SINCOS/ 0.05	0.2
Repeatability	μm	±0.5	±1.0
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload	kg	2.0	
No-load Moving Mass	kg	0.3	
No-load Total Mass	kg	1.1	
Max. Static Moment	Nm	0.8	

❶ Measurement is taken at ambient temperature 25℃. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



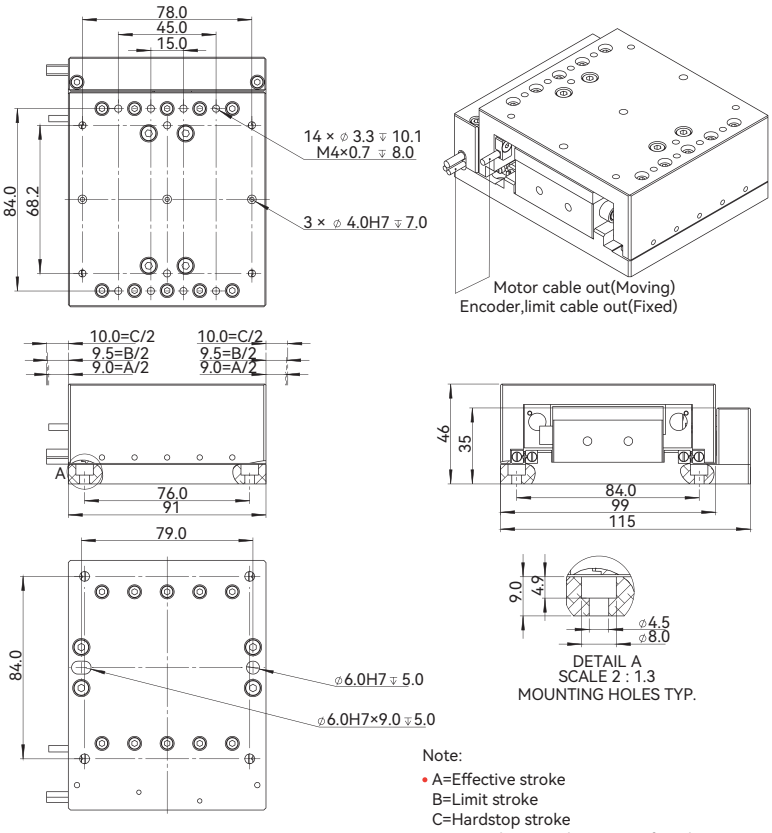
Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- Clearance fit for pin holes;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

XRV115

Motor Specifications	Unit	Value	
Motor	-	AVA3-20	
Continuous Force (NC) @100℃ ❶❷	N	26.32	
Peak Force ❷	N	79.0	
Force Constant ±10% ❷	N/A	9.40	
Back EMF Constant ±10% ❷	V/(m/s)	9.40	
Resistance (L-L) @25℃ ±10% ❸	Ω	1.6	
Inductance (L-L) ±20% ❹	mH	0.7	
Continuous Current (NC) @100℃ ❶	A	2.8	
Peak Current	A	8.4	
Max. Bus Voltage	Vdc	60	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	20	
Resolution	μm	SINCOS/ 0.05	0.2
Repeatability	μm	±0.5	±1.0
Horizontal Straightness	μm	±2.5	
Vertical Straightness	μm	±2.5	
Rated Payload	kg	3.0	
No-load Moving Mass	kg	0.46	
No-load Total Mass	kg	2.0	
Max. Static Moment	Nm	0.8	

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Note:
- A=Effective stroke
  B=Limit stroke
  C=Hardstop stroke
- Home index near the center of stroke;
- Clearance fit for pin holes;
- To maintain accuracy,mounting surface must be flat within 5μm over stage entire footprint.

Ordering Part Number (OPN)

XRV76–T20–A0G4–A1

- Model: XRV76, XRV97, XRV115
- Precision Grade: Unmarked: Normal
- Cover Type: T: Standard (Black Anodized)
- Stroke: 20: 20mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15
- Cable Length: A: 0.5m
- Scale Type: 4: Nickel, 14ppm/K
- Encoder Type: A0G: ABI-21 (0.2μm)

XRV76P–T20–R0A2–A1

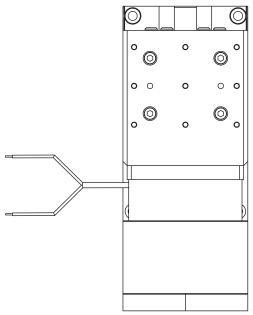
- Model: XRV76, XRV97, XRV115
- Precision Grade: P: Precision
- Cover Type: T: Standard (Black Anodized)
- Stroke: 20: 20mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15
- Cable Length: A: 0.5m
- Scale Type: 2: Glass G8 Soda Lime, 8ppm/K
- Encoder Type: R0A: ATOM2, SINCOS (1Vpp); R0J: ATOM2, TTL (0.05μm)

Note:

★Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

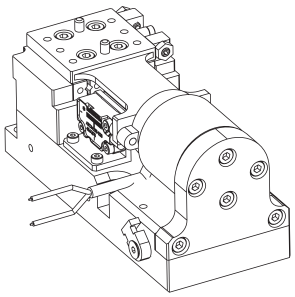
XMGV Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	Positive	Red
-	Negative	White



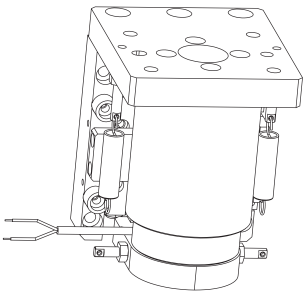
XCV Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	Positive	White
-	Negative	Black



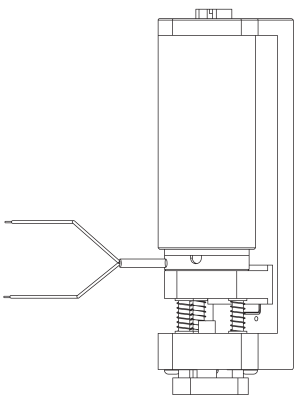
TGV Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	Positive	Red
-	Negative	White



MBV Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	Positive	Red
-	Negative	White



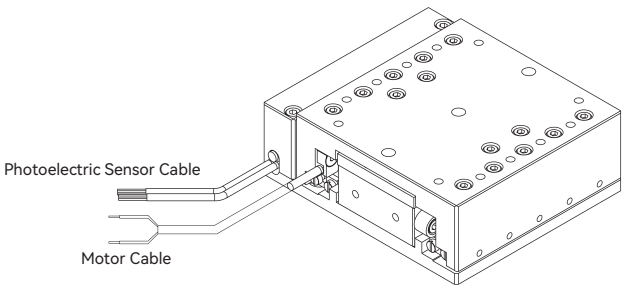
XRV Cable Connection Diagram

Photoelectric Sensor Cable

PIN	DESCRIPTION	COLOR
-	+5~24V	Brown
-	GND	Blue
-	Output1	Black
-	Output2	White

Motor Cable

PIN	DESCRIPTION	COLOR
-	Positive	White
-	Negative	Red



MINIATURE MODULES

MINIATURE MODULES

Akribis Miniature Modules consists of micro linear motor, micro guide rail, encoder position feedback and structural base. The internal structure is extremely compact. It is a high-precision positioning motion stage.

For horizontal axis, AML series and AMS series micro platforms can be selected. For Z axis vertical axis, AMZ series micro platforms and AML (with special counterbalance design) are best suited. And for Rotating shaft, AMR series micro platform should be selected.

All series of standard modules are widely used in Akribis Miniature Stages dedicated linear motors, with high precision, high response, high rigidity, high stability, maintenance-free and cost-effective features. Suitable for optical focusing.

Miniature Modules

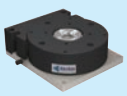
AML Series

Compact direct-drive positioning stage
- Stroke from 10mm to 20mm and other travel lengths can be customized
- Repeatability up to ±0.3μm
- It can be combined flexibly to form an XY stage or combined with AMR/AMZ to form an XYT or XYZT stage

▶ Applicable to:
- Submicron positioning, optical alignment stage, force control

★ Applications:
They are applied to point-to-point high-speed positioning, optical alignment, micro-assembly, Z-axis optical focusing, high-speed pick-and-place, flying probe test, and optical fiber alignment for automation equipment of all industries.

AMR Series



Micro direct-drive rotation positioning stage
- Boundary dimension, length×width×height=76×65×25mm
- Rotation angle of 50 degree is available and other sizes of angle can be customized
- Built-in grating scale and repeatability accuracy up to ±0.5arcsec
- It can be combined with AMS or AML flexibly to form an XT or XYT stage

▶ Applicable to:
- High-precision rotation correction positioning, optical alignment stage

★ Applications:
They are applied to point-to-point high-speed rotation positioning/ correcting, optical alignment and micro assembly for automation equipment of all industries.

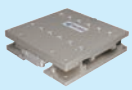
AMZ Series

Compact direct-drive Z-axis positioning stage
- Stroke from 8mm and other travel lengths can be customized
- Built-in grating scale and repeatability up to ±0.2μm
- It can be combined with AMS/AML or AMR flexibly to form an XZ, XYZ or XYZT stage
- Built-in cylinder weight

▶ Applicable to:
- Submicron positioning, optical alignment stage

★ Applications:
They are applied to point-to-point high-speed optical positioning, Z-axis optical focusing, micro assembly, and optical fiber alignment for automation equipment of all industries.

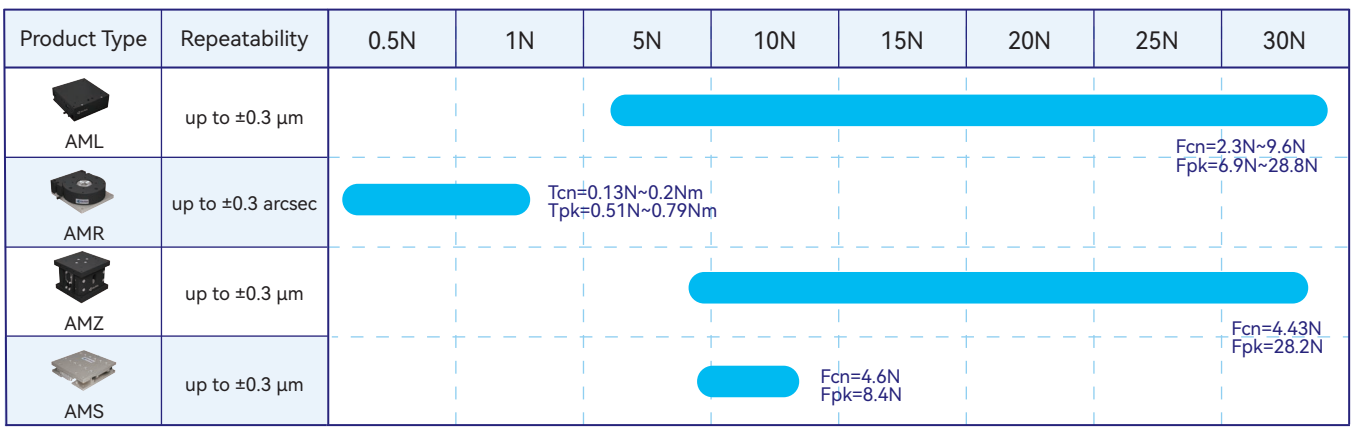
AMS Series



- Stroke from 15mm and other travel lengths can be customized
- Built-in grating scale and repeatability up to ±0.3μm
- It can be combined flexibly to form an XY stage or combined with AMR to form an XT or XYT stage

▶ Applicable to:
- Submicron positioning, optical alignment stage, force control

★ Applications:
They are applied to point-to-point high-speed positioning, optical alignment, micro-assembly, Z-axis optical focusing, high-speed pick-and-place, flying probe test, and optical fiber alignment for automation equipment of all industries.



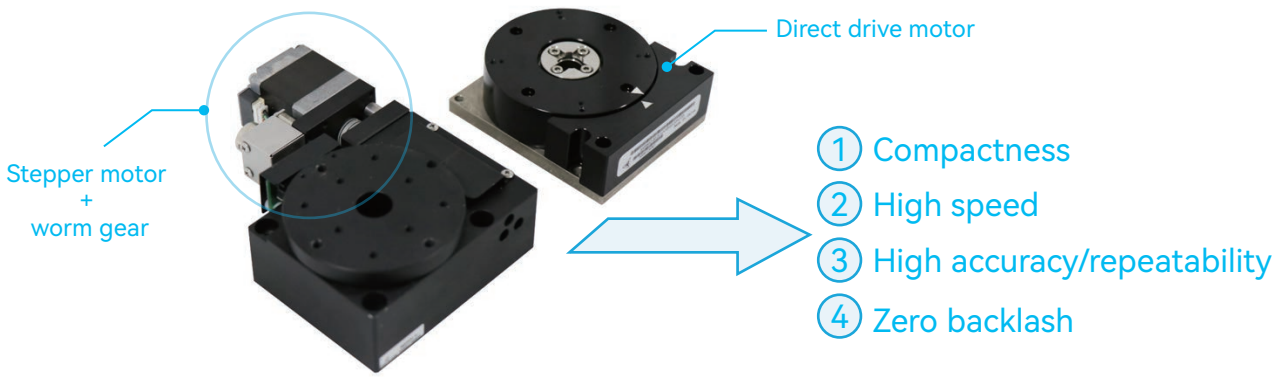
Applications: Used in electrical and semiconductor manufacturing, solar PV and lithium battery manufacturing equipment, LCD display, hard disc, PCB, high precision manufacturing, CNC, automotive electronics, packaging, printing, optics and bio-medical industry etc.

AM Series

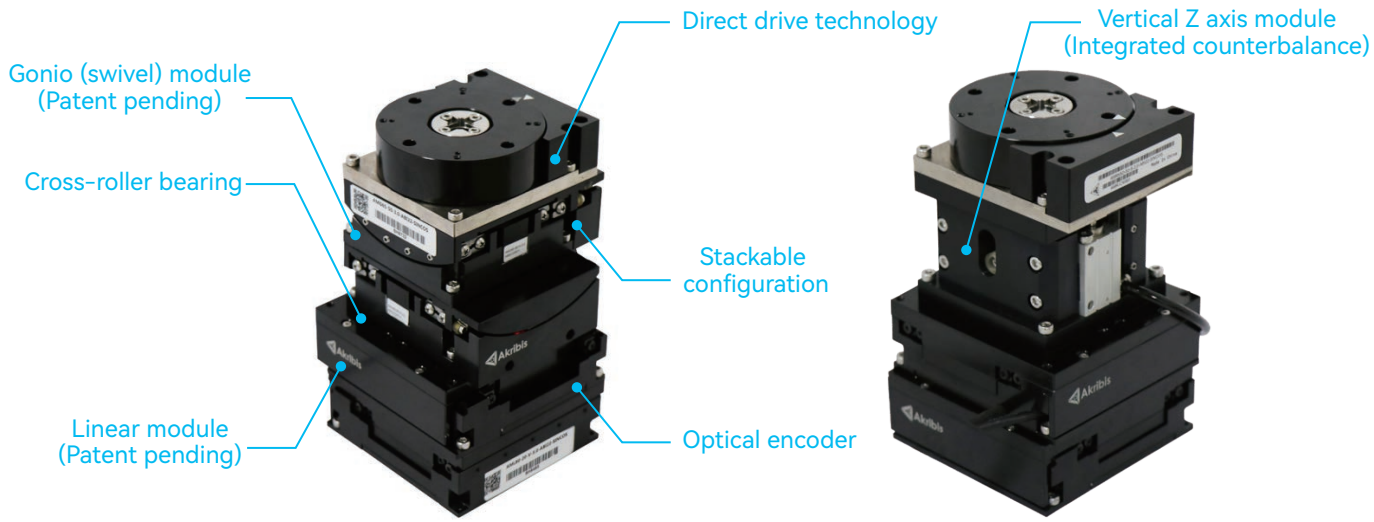
Introduction

AM series is a family of Akribis direct drive stages. “M” denotes “Miniature”, indicating its compactness. The elegant mechatronics design integrates the technology of motor, mechanics and sensors.

Why direct drive?

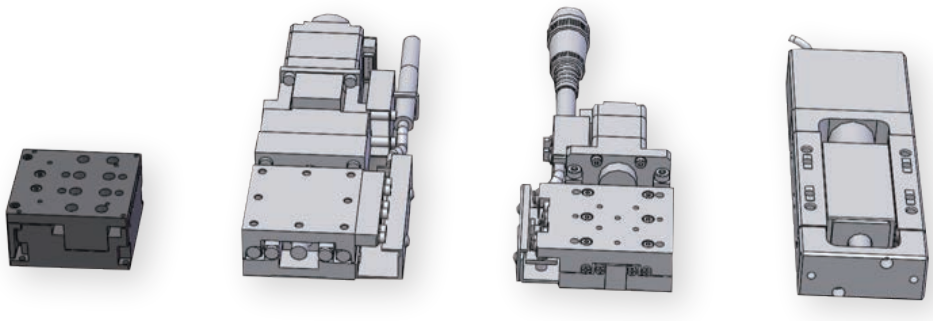


Features



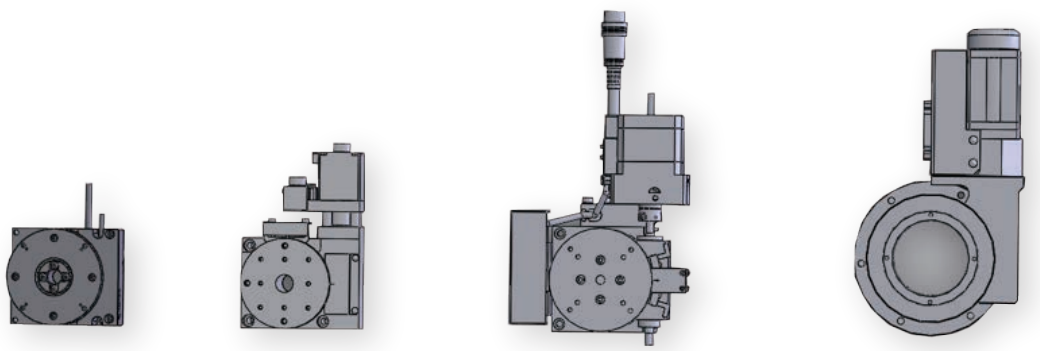
Comparison

AML

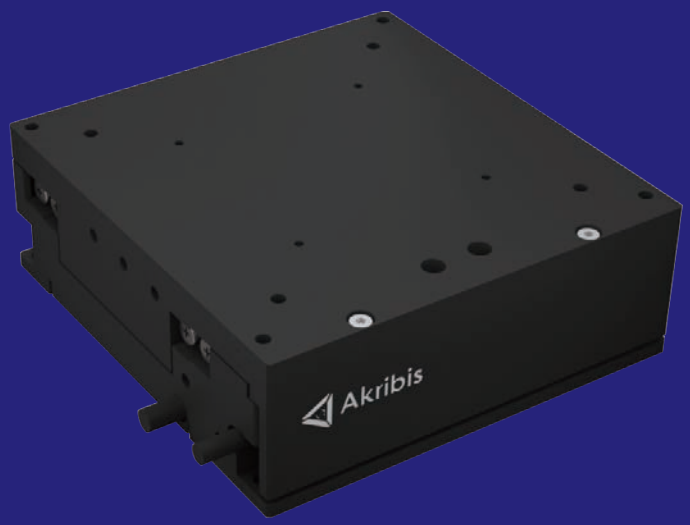


Specifications	Unit	Akribis	Brand X	Brand Y	Brand Z
Motor	-	Direct drive motor	Stepper motor + ball screw	Stepper motor + ball screw	Stepper motor + ball screw
Guide	-	Cross-roller bearing	Ball bearing	Cross-roller bearing	Ball bearing
Feedback	-	Optical encoder	N/A	N/A	Motor mounted encoder
Table size	mm	40×40	40×40	40×40	25×25
Dimension	mm	43×40×23	142.5×56.8×24.0	97×55×20.5	133.5×45×20
Repeatability	μm	±0.3	±0.5	±0.3	±0.75
Lost motion	μm	0	1	1	N/A
Backlash	μm	0	0.5	0.5	N/A
Max.speed	mm/s	400	10	10	1
Stroke	mm	10	13	10	25

AMR



Specifications	Unit	Akribis	Brand X	Brand Y	Brand Z
Motor	-	Direct drive motor	Stepper motor + worm	Stepper motor + worm	Stepper motor + worm
Feedback	-	Optical	N/A	N/A	N/A
Diameter	mm	65	60	68	84
Dimension	mm	65×76×25	123.5×79×35	140×109×30	212.6×110×50
Max.speed	degree/s	720	64	20	20
Lost motion	arcsec	0	0.2	N/A	N/A
Backlash	arcsec	0	0.6	0.06	N/A
Stroke	degree	50	11	270	N/A



AML SERIES
LINEAR MODULE

- Compact design
- Direct drive technology
- High precision optical encoder
- High response
- Stackable configuration

EN-25.5.1

Introduction

The AML series micro positioning stage consists of micro linear motor, micro guide rail, encoder position feedback and structural base. The internal structure is extremely compact. It is a high-precision positioning motion stage.

There are three standard products: AML40, AML65 and AML80. The micro motor and encoder position feedback built in the three standard modules can be selected according to the actual technical requirements. Customization service is available.

Continuous Force Fcn = 2.3N~9.6N
Peak Force Fpk = 6.9N~28.8N

Features

- Direct-drive, compact design
- Stroke from 10mm to 20mm
- Repeatability up to ±0.3μm
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- It can be combined flexibly to form an XY stage or with AMR/AMZ to form an XYT or XYZT stage

Applications

Submicron positioning, optical alignment stage and force control.

They are applied to point-to-point high-speed positioning, optical alignment, Z-axis optical focusing, high speed pick and place, flying probe test and fiber optical alignment for automation equipment of all industries.

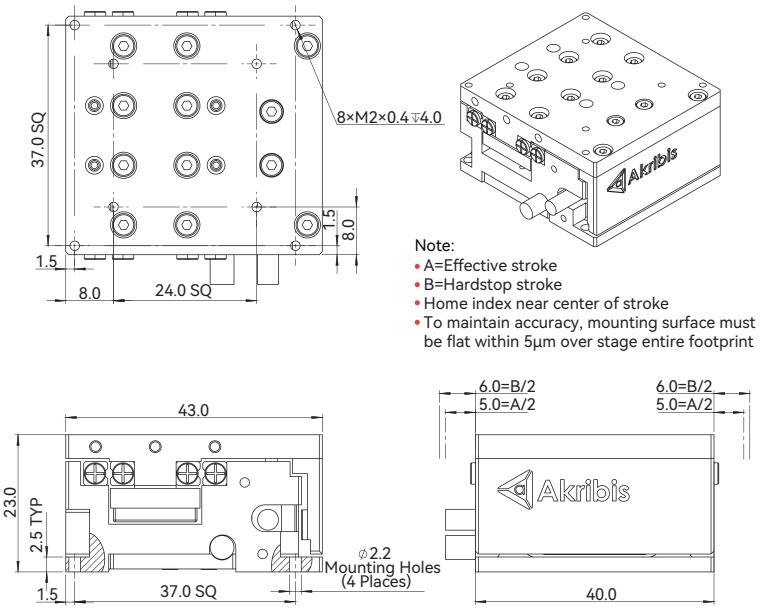
Miniature Modules	Continuous Force (F_{cn}) / Peak Force (F_{pk}) Unit: N 5 10 15 20 25 30	Stroke[1] (mm)	Repeatability (μm)	Page
 AML40	2.3 — 6.9	10	up to ±0.3	124
 AML65	5.9 — 17.7	15		124
 AML80	9.6 — 28.8	20		125

Note:
[1] Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

AML40

Motor Specifications	Unit	Value	
Motor	-	AML40-10	
Continuous Force (NC) @100°C ❶❷	N	2.3	
Peak Force ❷	N	6.9	
Force Constant ±10% ❷	N/A	0.8	
Back EMF Constant ±10% ❷	V/(m/s)	0.8	
Resistance @25°C ±10% ❸	Ω	0.89	
Inductance ±20% ❹	mH	0.15	
Continuous Current (NC) @100°C ❶	A	2.9	
Peak Current	A	8.7	
Max. Voltage	Vdc	48	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade ❺	-	P	N
Effective Stroke	mm	10	
Resolution	µm	SINCOS/0.05	0.2
Repeatability	µm	±0.3	±1.0
Horizontal Straightness	µm	±1.0	±1.5
Vertical Straightness	µm	±1.0	±1.5
Minimum Incremental Motion ❻	µm	< 0.1	-
Rated Payload ❼❽	kg	0.85	
No-Load Moving Mass	kg	0.06	
No-Load Total Mass	kg	0.16	
Max. Static Moment ❽	Nm	0.1	

Dimensional Drawing



Note:
- A=Effective stroke
- B=Hardstop stroke
- Home index near center of stroke
- To maintain accuracy, mounting surface must be flat within 5µm over stage entire footprint

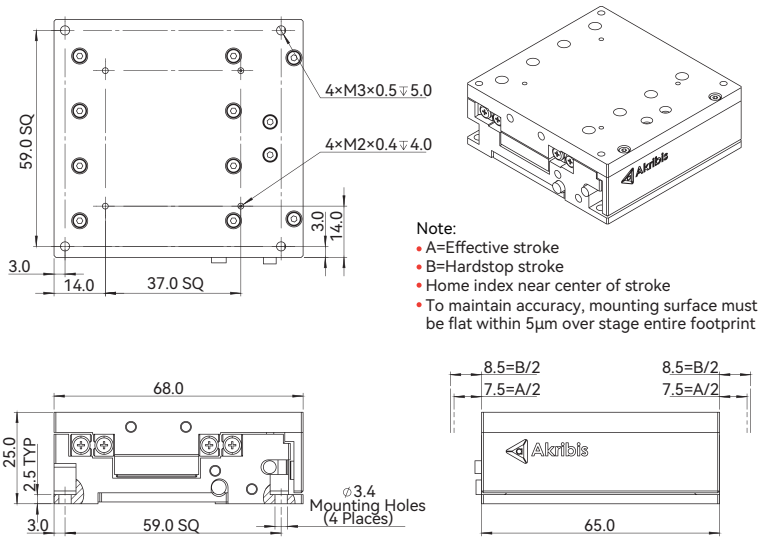
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.
❺ Normal grade without anti-creep cross roller, precision grade with anti-creep cross roller.
❻ Encoder interpolated to 5nm resolution, measured by laser interferometer.
❼ Load capacity of module without cantilever.
❽ This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

The contents of datasheet are subject to change without prior notice.

AML65

Motor Specifications	Unit	Value	
Motor	-	AML65-15	
Continuous Force (NC) @100°C ❶❷	N	5.9	
Peak Force ❷	N	17.7	
Force Constant ±10% ❷	N/A	2.2	
Back EMF Constant ±10% ❷	V/(m/s)	2.2	
Resistance @25°C ±10% ❸	Ω	1.76	
Inductance ±20% ❹	mH	0.72	
Continuous Current (NC) @100°C ❶	A	2.7	
Peak Current	A	8.0	
Max. Voltage	Vdc	48	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade ❺	-	P	N
Effective Stroke	mm	15	
Resolution	µm	SINCOS/0.05	0.2
Repeatability	µm	±0.3	±1.0
Horizontal Straightness	µm	±1.0	±1.5
Vertical Straightness	µm	±1.0	±1.5
Minimum Incremental Motion ❻	µm	< 0.1	-
Rated Payload ❼❽	kg	2.0	
No-Load Moving Mass	kg	0.18	
No-Load Total Mass	kg	0.39	
Max. Static Moment ❽	Nm	0.5	

Dimensional Drawing



Note:
- A=Effective stroke
- B=Hardstop stroke
- Home index near center of stroke
- To maintain accuracy, mounting surface must be flat within 5µm over stage entire footprint

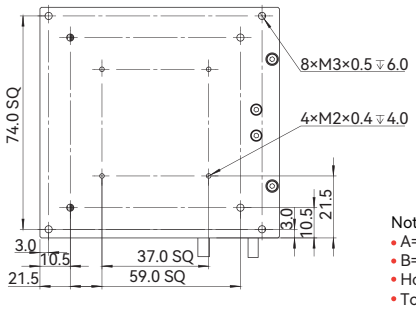
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.
❺ Normal grade without anti-creep cross roller, precision grade with anti-creep cross roller.
❻ Encoder interpolated to 5nm resolution, measured by laser interferometer.
❼ Load capacity of module without cantilever.
❽ This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.

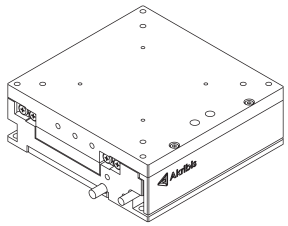
The contents of datasheet are subject to change without prior notice.

AML80

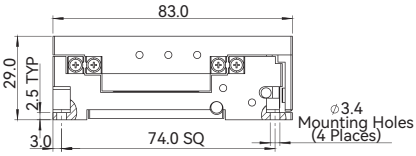
Motor Specifications	Unit	Value	
Motor	-	AML80-20	
Continuous Force (NC) @100°C ❶❷	N	9.6	
Peak Force ❷	N	28.8	
Force Constant ±10% ❷	N/A	4.5	
Back EMF Constant ±10% ❷	V/(m/s)	4.5	
Resistance @25°C ±10% ❸	Ω	3.26	
Inductance ±20% ❹	mH	2.53	
Continuous Current (NC) @100°C ❶	A	2.1	
Peak Current	A	6.4	
Max. Voltage	Vdc	48	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade ❺	-	P	N
Effective Stroke	mm	20	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.3	±1.0
Horizontal Straightness	μm	±1.0	±2.0
Vertical Straightness	μm	±1.0	±2.0
Minimum Incremental Motion ❻	μm	< 0.1	-
Rated Payload ❼❽	kg	2.5	
No-Load Moving Mass	kg	0.34	
No-Load Total Mass	kg	0.71	
Max. Static Moment ❽	Nm	0.82	

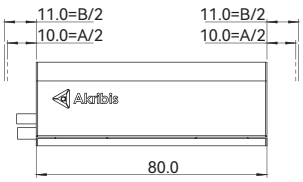
Dimensional Drawing





Note:
- A=Effective stroke
- B=Hardstop stroke
- Home index near center of stroke
- To maintain accuracy, mounting surface must be flat within 5μm over stage entire footprint





❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.
❺ Normal grade without anti-creep cross roller, precision grade with anti-creep cross roller.
❻ Encoder interpolated to 5nm resolution, measured by laser interferometer.
❼ Load capacity of module without cantilever.
❽ This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

AML40-T10-A0G4-A1

Model:
AML40/AML65/AML80

Precision Grade:
Unmarked: Normal ❶

Cover Type:
T: Standard (Black Anodized)

Effective Stroke (Corresponding Models):
10: 10mm (AML40)
15: 15mm (AML65)
20: 20mm (AML80)

Termination:
1: Motor: Flying Leads/Encoder: DSUB 15
2: Motor: TYCO2/Encoder: DSUB 15

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
4: Nickel, 14ppm/K

Encoder Type:
A0G: ABI-21, TTL (0.2μm)

AML40P-T10-R0A2-A1

Model:
AML40/AML65/AML80

Precision Grade:
P: Precision ❷

Cover Type:
T: Standard (Black Anodized)

Effective Stroke (Corresponding Models):
10: 10mm (AML40)
15: 15mm (AML65)
20: 20mm (AML80)

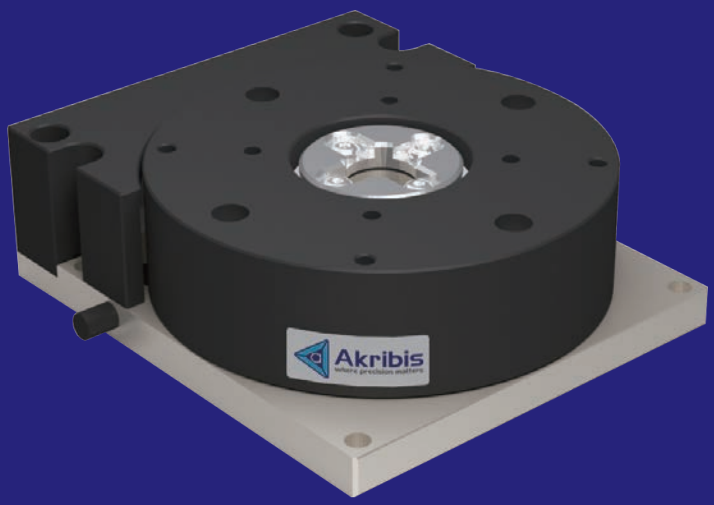
Termination:
1: Motor: Flying Leads/Encoder: DSUB 15
2: Motor: TYCO2/Encoder: DSUB 15

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
2: Glass G8 Soda Lime, 8ppm/K

Encoder Type:
R0A: ATOM2, SINCOS (1Vpp)
R0J: ATOM2, TTL (0.05μm)

Note:
❶ Normal Grade uses non anti-creep roller.
❷ Precision Grade uses anti-creep roller.
★ Default mounting orientation for this module is horizontal. For other mounting orientations, please contact cust-service@akribis-sys.com.



AMR SERIES ROTARY MODULE

- Compact design
- Direct drive technology
- Cogging free
- High precision optical encoder
- Stackable configuration

EN-25.5.1

Introduction

The AMR series micro positioning stage consists of miniature arc linear motor, miniature arc guide rail, encoder position feedback and structural base. The internal structure is extremely compact. It is a high-precision positioning motion stage.

There are two standard products: AMR65D and AMR80D. The micro motor and encoder position feedback built in the two standard modules can be selected according to the actual technical requirements. Customization service is available.

Continuous Torque Tcn = 0.13Nm~0.2Nm
Peak Torque Tpk = 0.51Nm~0.79Nm

Features

- Micro direct-drive rotation positioning stage
- Boundary dimension, length×width×height = 76×65×25mm
- Rotation angle of 50 & 100 degree is available and other sizes of angle can be customized
- Built-in grating scale and repeatability up to ±0.5arcsec
- It can be combined with AMS or AML flexibly to form an XT or XYT stage

Applications

Precision rotation correction positioning, optical alignment stage.

Applicable to point-to-point high-speed rotation positioning/correcting, optical alignment, micro assembly and fiber optical alignment for automation equipment of all industries.

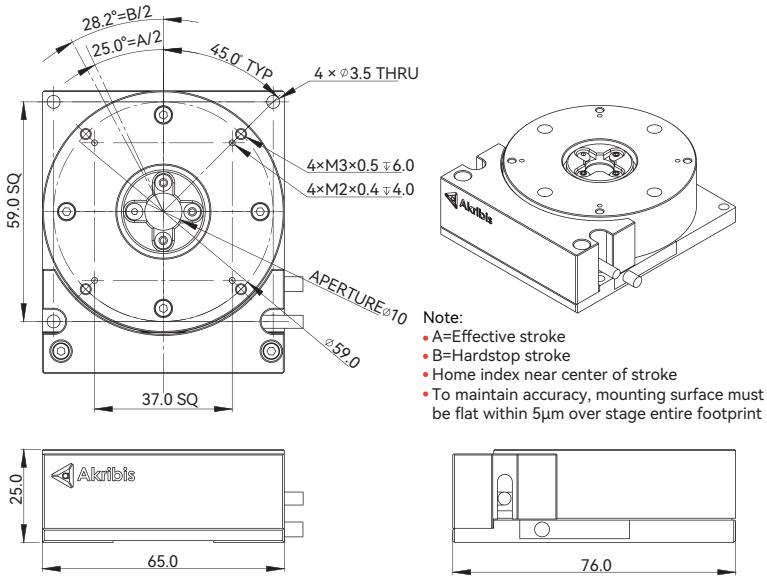
Miniature Modules	Continuous Torque (T_{cn}) / Peak Torque (T_{pk}) Unit: Nm 0.1 | 0.2 | 0.4 | 0.6 | 0.8 | 1.0	Stroke[1] (degree)	Repeatability (arcsec)	Page
 AMR65	0.13 — 0.51	50	up to ±0.5	128
 AMR80	0.2 — 0.79	100		128

Note:
[1] Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

AMR65

Motor Specifications	Unit	Value	
Motor	-	AMR65D-50	
Continuous Torque (NC) @100°C [1]	Nm	0.13	
Peak Torque	Nm	0.51	
Torque Constant ±10%	Nm/Arms	0.12	
Back EMF Constant ±10%	Vpeak/rpm	1.00E-02	
Resistance (L-L) @25°C ±10% [2]	Ω	8	
Inductance (L-L) ± 20% [3]	mH	0.75	
Continuous Current (NC) @100°C [1]	Arms	1.1	
Peak Current	Arms	4.4	
Max. Bus Voltage	Vdc	48	
Pole Number	-	16	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	degree	50	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	arcsec	±0.5	±0.5
Max. Speed	degree/s	720	
Rotor Inertia	kg.m²	0.0014	
No-load Total Mass	kg	0.52	
Max. Static Axial Load	N	30	
Max. Static Moment [4]	Nm	0.84	

Dimensional Drawing



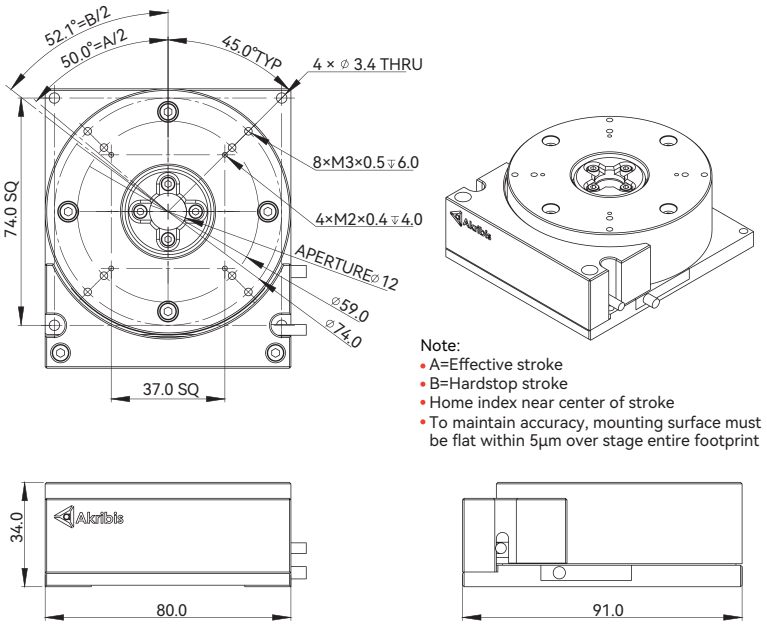
Note:
- A=Effective stroke
- B=Hardstop stroke
- Home index near center of stroke
- To maintain accuracy, mounting surface must be flat within 5μm over stage entire footprint

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC=Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1kHz.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.
The contents of datasheet are subject to change without prior notice.

AMR80

Motor Specifications	Unit	Value	
Motor	-	AMR80D-100	
Continuous Torque (NC) @100°C [1]	Nm	0.2	
Peak Torque	Nm	0.79	
Torque Constant ±10%	Nm/Arms	0.2	
Back EMF Constant ±10%	Vpeak/rpm	1.69E-02	
Resistance (L-L) @25°C ±10% [2]	Ω	9.3	
Inductance (L-L) ±20% [3]	mH	1	
Continuous Current (NC) @100°C [1]	Arms	1	
Peak Current	Arms	4	
Max. Bus Voltage	Vdc	48	
Pole Number	-	16	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	degree	100	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	arcsec	±0.5	±0.5
Max. Speed	degree/s	720	
Rotor Inertia	kg.m²	0.0016	
No-load Total Mass	kg	1.1	
Max. Static Axial Load	N	60	
Max. Static Moment [4]	Nm	2.0	

Dimensional Drawing



Note:
- A=Effective stroke
- B=Hardstop stroke
- Home index near center of stroke
- To maintain accuracy, mounting surface must be flat within 5μm over stage entire footprint

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC=Natural Cooling, AC=Air Cooling, WC=Water Cooling.
[2] Resistance is measured by DC current with standard 0.5m cable.
[3] Inductance is measured by current frequency of 1kHz.
[4] This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

AMR65-T50-A0G4-A1

- Model: AMR65/AMR80
- Precision Grade: Unmarked: Normal
- Cover Type: T: Standard (Black Anodized)[1] / E: EN[2]
- Effective Stroke (Corresponding Models): 50: 50deg (AMR65) / 100: 100deg (AMR80)
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15 / 2: Motor: TYCO4/Encoder: DSUB 15
- Cable Length: A: 0.5m / B: 3.0m
- Scale Type: 4: Nickel, 14ppm/K
- Encoder Type: A0G: ABI-21, TTL (0.2μm)

AMR65P-T50-R0A1-A1

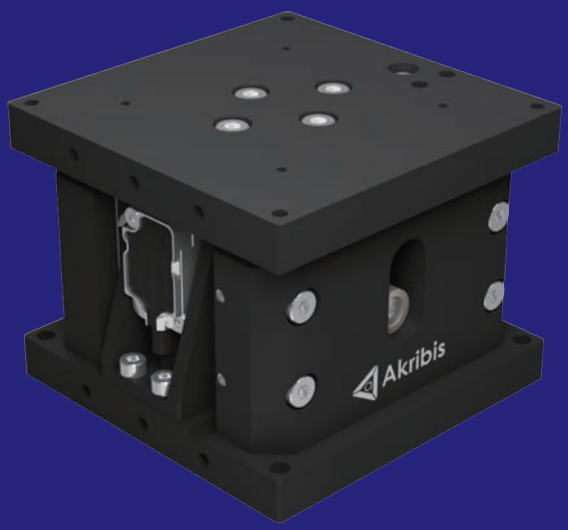
- Model: AMR65/AMR80
- Precision Grade: P: Precision
- Cover Type: T: Standard (Black Anodized)[1] / E: EN[2]
- Effective Stroke (Corresponding Models): 50: 50deg (AMR65) / 100: 100deg (AMR80)
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15 / 2: Motor: TYCO4/Encoder: DSUB 15
- Cable Length: A: 0.5m / B: 3.0m
- Scale Type: 1: Steel Tape, 11ppm/K
- Encoder Type: R0A: ATOM2, SINCOS (1Vpp) / R0J: ATOM2, TTL (0.05μm)

Note:

[1] Black anodized AMR is used with AML and AMZ.

[2] Nickel plated AMR is used with AMS.

★Default mounting orientation for this module is horizontal. For other mounting orientations, please contact cust-service@akribis-sys.com.



AMZ SERIES
VERTICAL Z MODULE

- Compact design
- Direct drive technology
- High response
- High precision optical encoder
- Stackable configuration

EN-25.5.1

Introduction

The AMZ series micro positioning stage consists of micro linear motor, micro guide rail, encoder position feedback and structural base. The internal structure is extremely compact. It is a high-precision positioning motion stage.

The encoder position feedback built in AMZ65 vertical micro positioning stage can be selected according to the actual technical requirements. Customization service is available.

Continuous Force Fcn = 4.43N
Peak Force Fpk = 28.2N

Features

- Compact and direct-drive Z-axis positioning stage
- Stroke from 8mm and other lengths of travel can be customized
- Built-in grating scale and repeatability up to ±0.2μm
- It can be combined with AMS/AML or AMR flexibly to form an XZ, XYZ or XYZT stage
- Built-in cylinder weight

Applications

Submicron positioning, optical alignment stage.

They are applied to point-to-point high-speed optical positioning, Z-axis optical focusing, micro assembly and fiber optical alignment for automation equipment of all industries.

Miniature Modules	■ Continuous Force (F_{cn}) ■ Peak Force (F_{pk}) Unit: N 1 / 3 / 5 / 10 / 30 / 50	Stroke[1] (mm)	Repeatability (μm)	Page
 AMZ65	4.43 / 28.2	8	up to ±0.2	132

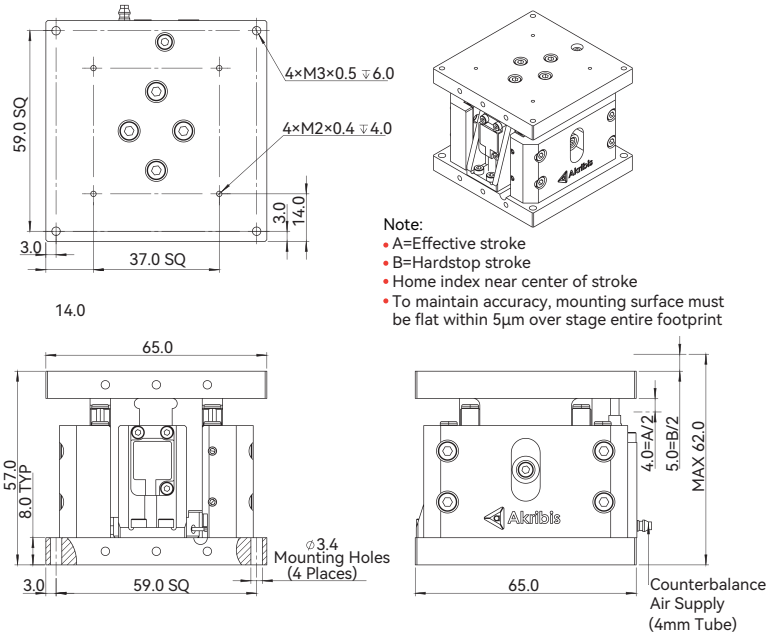
Note:
[1] Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

AMZ65

Motor Specifications	Unit	Value
Motor	-	AVM30-15
Continuous Force (NC) @100°C ❶❷	N	4.43
Peak Force ❷	N	28.2
Force Constant ±10% ❷	N/A	7.03
Back EMF Constant ±10% ❷	V/(m/s)	7.03
Resistance @25°C ±10% ❸	Ω	10.24
Inductance ±20% ❹	mH	2.82
Continuous Current (NC) @100°C ❶	A	0.6
Peak Current	A	4.0
Max. Voltage	Vdc	60

Mechanical Specifications	Unit	Value	
Precision Grade	-	P	N
Effective Stroke	mm	8	
Resolution	μm	SINCOS/0.05	0.2
Repeatability	μm	±0.2	±1.0
Horizontal Straightness	μm	±1.5	
Vertical Straightness	μm	±1.5	
Rated Payload ❺	kg	1.0	
No-Load Moving Mass	kg	0.29	
No-Load Total Mass	kg	0.6	
Max. Static Moment ❻	Nm	0.1	

Dimensional Drawing



Note:
- A=Effective stroke
- B=Hardstop stroke
- Home index near center of stroke
- To maintain accuracy, mounting surface must be flat within 5μm over stage entire footprint

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.
❺ Load capacity of module without cantilever.
❻ This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.
★ Maximum pressure allowed for Air Cylinder Counter-balance is 0.6MPa which provides maximum 17N counterbalance force.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

AMZ65-T08-A0G4-A1

- Model: AMZ65
- Precision Grade: Unmarked: Normal ❶
- Cover Type: T: Standard (Black Anodized)
- Effective Stroke: 08: 8mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15; 2: Motor: TYCO2/Encoder: DSUB 15
- Cable Length: A: 0.5m; B: 3.0m
- Scale Type: 4: Nickel, 14ppm/K
- Encoder Type: A0G: ABI-21, TTL (0.2μm)

AMZ65P-T08-R0A2-A1

- Model: AMZ65
- Precision Grade: P: Precision ❶
- Cover Type: T: Standard (Black Anodized)
- Effective Stroke: 08: 8mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15; 2: Motor: TYCO2/Encoder: DSUB 15
- Cable Length: A: 0.5m; B: 3.0m
- Scale Type: 2: Glass G8 Soda Lime, 8ppm/K
- Encoder Type: R0A: ATOM2, SINCOS (1Vpp); R0J: ATOM2, TTL (0.05μm)

Note:
❶ Normal Grade and Precision Grade uses anti-creep roller.
★ Default mounting orientation for this module is horizontal. For other mounting orientations, please contact cust-service@akribis-sys.com.

AMS SERIES
LINEAR MODULE

- Low profile
- Direct drive technology
- High response
- High precision optical encoder
- Stackable configuration

EN-25.5.1

AMS Series

Introduction

The AMS series micro positioning stage consists of micro linear motor, micro guide rail, encoder position feedback and a structural base. The internal structure is extremely compact. It is a high-precision positioning motion stage.

The encoder position feedback built in AMS series micro positioning stage can be selected according to the actual technical requirements. Customization service is available.

Continuous Force Fcn = 4.6N
Peak Force Fpk = 8.4N

Features

- Direct-drive, compact design
- Stroke from 15mm and other lengths of travel can be customized
- Built-in grating scale and repeatability up to ±0.3μm
- Optional resolution of 0.2μm, 0.05μm, SINCOS
- It can be combined flexibly to form an XY stage or with AMR to form an XT or XYT stage

Applications

Submicron positioning, optical alignment stage, force control.

They are applied to point-to-point high-speed positioning, optical alignment, Z-axis optical focusing, high speed pick and place, flying probe test and fiber optical alignment for automation equipment of all industries.

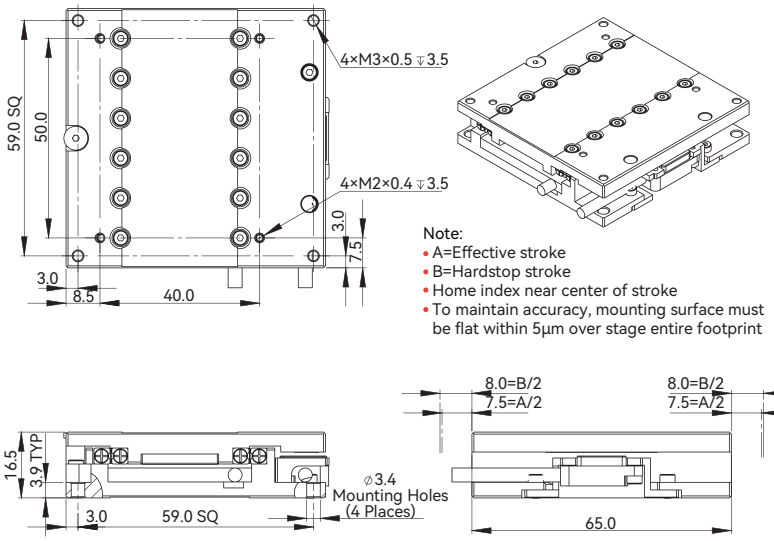
Miniature Modules	■ Continuous Force (F_{cn}) ■ Peak Force (F_{pk}) Unit: N 1 2 4 6 8 10	Stroke (mm)[1]	Repeatability (μm)	Page
 AMS65	4.6 8.4	15	up to ±0.3	135

Note:
[1] Longer stroke available upon request.
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

AMS65

Motor Specifications	Unit	Value	
Motor	-	AMS65X	
Continuous Force (NC) @100°C ❶❷	N	4.6	
Peak Force ❷	N	8.4	
Force Constant ±10% ❷	N/A	1.6	
Back EMF Constant ±10% ❷	V/(m/s)	1.6	
Resistance @25°C ±10% ❸	Ω	1.3	
Inductance ±20% ❹	mH	0.65	
Continuous Current (NC) @100°C ❶	A	2.9	
Peak Current	A	5.2	
Max. Voltage	Vdc	48	
Mechanical Specifications	**Unit**	**Value**	
Precision Grade	-	P	N
Effective Stroke	mm	15	
Resolution	µm	SINCOS/0.05	0.2
Repeatability	µm	±0.3	±1.0
Horizontal Straightness	µm	±1.5	
Vertical Straightness	µm	±1.5	
Rated Payload ❺❻	kg	1.40	
No-Load Moving Mass	kg	0.18	
No-Load Total Mass	kg	0.42	
Max. Static Moment ❻	Nm	0.31	

Dimensional Drawing



❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.
❺ Load capacity of module without cantilever.
❻ This value is based on providing a higher control bandwidth, please contact cust-service@akribis-sys.com for higher load requirements.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

AMS65-E15-A0G4-A1

- Model: AMS65
- Precision Grade: Unmarked: Normal ❶
- Cover Type: E: EN
- Effective Stroke: 15: 15mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15; 2: Motor: TYCO2/Encoder: DSUB 15
- Cable Length: A: 0.5m; B: 3.0m
- Scale Type: 4: Nickel, 14ppm/K
- Encoder Type: A0G: ABI-21, TTL (0.2µm)

AMS65P-E15-R0A2-A1

- Model: AMS65
- Precision Grade: P: Precision ❷
- Cover Type: E: EN
- Effective Stroke: 15: 15mm
- Termination: 1: Motor: Flying Leads/Encoder: DSUB 15; 2: Motor: TYCO2/Encoder: DSUB 15
- Cable Length: A: 0.5m; B: 3.0m
- Scale Type: 2: Glass G8 Soda Lime, 8ppm/K
- Encoder Type: R0A: ATOM2, SINCOS (1Vpp); R0J: ATOM2, TTL (0.05µm)

Note:
❶ Normal Grade uses non anti-creep roller.
❷ Precision Grade uses anti-creep roller.
★ Default mounting orientation for this module is horizontal. For other mounting orientations, please contact cust-service@akribis-sys.com.

AML

Motor Performance Parameters	Unit	AML40-10	AML65-15	AML80-20
Continuous Force @100°C ❶❷	N	2.3	5.9	9.6
Peak Force ❷	N	6.9	17.7	28.8
Force Constant ±10% ❷	N/A	0.8	2.2	4.5
Back EMF Constant ±10% ❷	V/(m/s)	0.8	2.2	4.5
Motor Constant @25°C ❷	N/Sqrt(W)	0.84	1.66	2.50
Resistance @25°C ±10% ❸	Ω	0.89	1.76	3.26
Inductance ±20% ❹	mH	0.15	0.72	2.53
Electrical Time Constant	ms	0.16	0.41	0.78
Continuous Current @100°C ❶	A	2.9	2.7	2.1
Peak Current	A	8.7	8.0	6.4
Continuous Power Dissipation @100°C ❶	W	9.6	16.3	19.1
Max. Coil Temperature	°C	100	100	100
Thermal Dissipation Constant ❶	W/°C	0.13	0.22	0.25
Max. Voltage	Vdc	48	48	48

Note:
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.

AMZ

Motor Performance Parameters	Unit	AVM30-15
Continuous Force @100°C ❶❷	N	4.43
Peak Force ❷	N	28.2
Force Constant ±10% ❷	N/A	7.03
Back EMF Constant ±10% ❷	V/(m/s)	7.03
Motor Constant @25°C ❷	N/Sqrt(W)	2.20
Resistance @25°C ±10% ❸	Ω	10.24
Inductance ±20% ❹	mH	2.82
Electrical Time Constant	ms	0.28
Continuous Current @100°C ❶	A	0.6
Peak Current	A	4.0
Continuous Power Dissipation @100°C ❶	W	5.2
Max. Coil Temperature	°C	100
Thermal Dissipation Constant ❶	W/°C	0.07
Max. Voltage	Vdc	60

Note:
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.

AMR

Motor Performance Parameters	Unit	AMR65D-50	AMR80D-100
Continuous Torque (NC) @100°C ❶	Nm	0.13	0.2
Peak Torque	Nm	0.51	0.79
Torque Constant ±10%	Nm/Arms	0.12	0.2
Back EMF Constant ±10%	Vpeak/rpm	1.00E-02	1.69E-02
Motor Constant @25°C	Nm/Sqrt(W)	3.00E-02	5.30E-02
Resistance (L-L) @25°C ±10% ❷	Ω	8	9.3
Inductance (L-L) ±20% ❸	mH	0.75	1
Electrical Time Constant	ms	0.09	0.11
Continuous Current (NC) @100°C ❶	Arms	1.1	1
Peak Current	Arms	4.4	4
Continuous Power Dissipation (NC) @100°C ❶	W	18.8	18.1
Max. Coil Temperature	°C	100	100
Thermal Dissipation Constant (NC) ❶	W/°C	0.25	0.24
Max. Bus Voltage	Vdc	48	48
Pole Number	p	16	16
Max. Speed	Degree/s	720	720

Note:
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC=Natural Cooling, AC=Air Cooling,
WC=Water Cooling.
❷ Resistance is measured by DC current with standard 0.5m cable.
❸ Inductance is measured by current frequency of 1kHz.

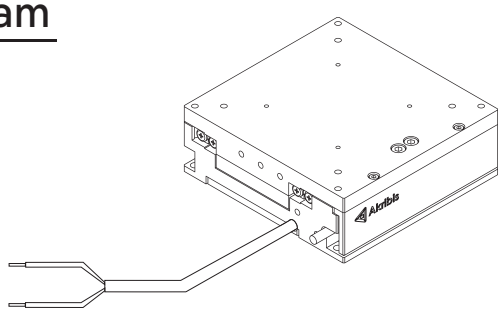
AMS

Motor Performance Parameters	Unit	AMS65X
Continuous Force @100°C ❶❷	N	4.6
Peak Force ❷	N	8.4
Force Constant ±10% ❷	N/A	1.6
Back EMF Constant ±10% ❷	V/(m/s)	1.6
Motor Constant @25°C ❷	N/Sqrt(W)	1.4
Resistance @25°C ±10% ❸	Ω	1.3
Inductance ±20% ❹	mH	0.65
Electrical Time Constant	ms	0.5
Continuous Current @100°C ❶	A	2.9
Peak Current	A	5.2
Continuous Power Dissipation @100°C ❶	W	13.5
Max. Coil Temperature	°C	100
Thermal Dissipation Constant ❶	W/°C	0.18
Max. Voltage	Vdc	48

Note:
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m cable.
❹ Inductance is measured by current frequency of 1kHz.

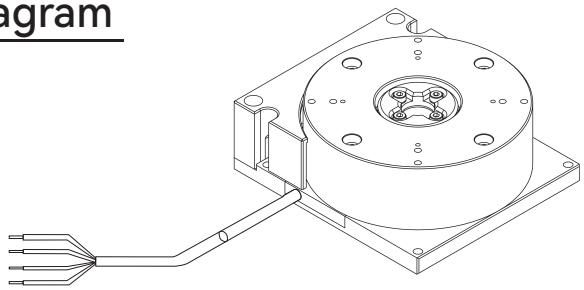
AML Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	Positive	White
-	Negative	Black



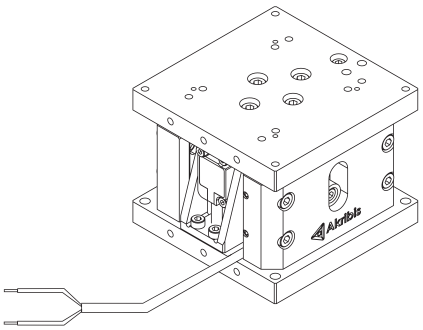
AMR Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	M1	Black
-	M2	Blue
-	M3	Red
-	GND	Green



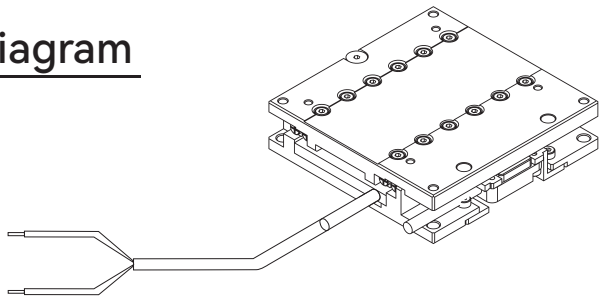
AMZ Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	Positive	Red
-	Negative	White



AMS Motor Cable Connection Diagram

PIN	DESCRIPTION	COLOR
-	Positive	White
-	Negative	Black



PICKER MODULES

PICKER MODULES

APC SERIES

- Z-axis 2G acceleration
- 30mm stroke and 2-axis option
- Compact 2-axis design at only 16mm thickness
- Vacuum tip
- High force to weight ratio

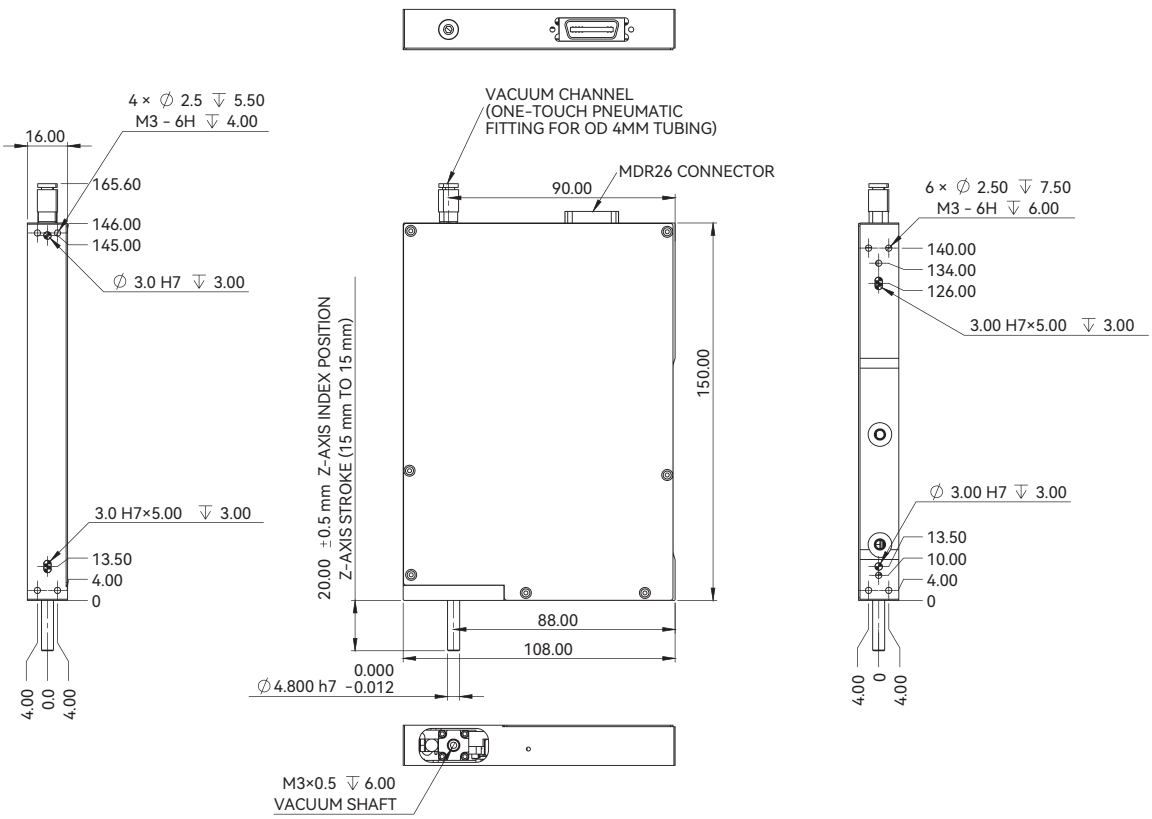
APC16B-ZT30

Motor Specifications	Z-axis	T-axis
Motor	ALM015-T-B1	TP12
Continuous Force (NC) @100°C [Z-axis]❶ Continuous Torque (NC) @100°C [T-axis]❶	10 N	7.40E-03 Nm
Peak Force [Z-axis] Peak Torque [T-axis]	36 N	1.85E-02 Nm
Force Constant ±10% [Z-axis] Torque Constant ±10% [T-axis]	8.1 N/Arms	9.25E-03 Nm/Arms
Back EMF Constant ±10%	6.6 Vpeak/(m/s)	7.91E-04 Vpeak/rpm
Resistance (L-L) @25°C ±10% [Z-axis❷ | T-axis❸]	4.51 Ω	2.63 Ω
Inductance (L-L) ±30% [Z-axis]❹ Inductance (L-L) ±20% [T-axis]❹	0.58 mH	0.23 mH
Continuous Current (NC) @100°C❶	1.23 Arms	0.80 Arms
Peak Current	4.4 Arms	2.00 Arms
Max. Bus Voltage [Z-axis | T-axis]	60 Vdc	48 Vdc
Magnetic Period	16.5 mm	-
Attraction Force	-	4
Mechanical Specifications	**Z-axis**	**T-axis**
Effective Stroke	30 mm	360° (Limitless)
Resolution	0.5 µm	491520 counts/rev
Repeatability	±5 µm	±20 arcsec
Rated Payload	0.04 kg	
No-Load Moving Mass [Z-axis] No-Load Rotor Inertia [T-axis]	0.2 kg	7.68E-08 kg·m²
No-Load Total Mass	1 kg	
Max. Acceleration	20 m/s²	600 rad/s²❺
Max. Velocity	0.5 m/s	60 rad/s❺
Max. Pressure	0.8 MPa	
Suction Air Flow Requirement	≥ 8 L/min [ANR]	

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Resistance is measured by DC current with standard 1.0m lead wire.
❹ Inductance is measured by current frequency of 1kHz.
❺ Max value for 1 revolution.

The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

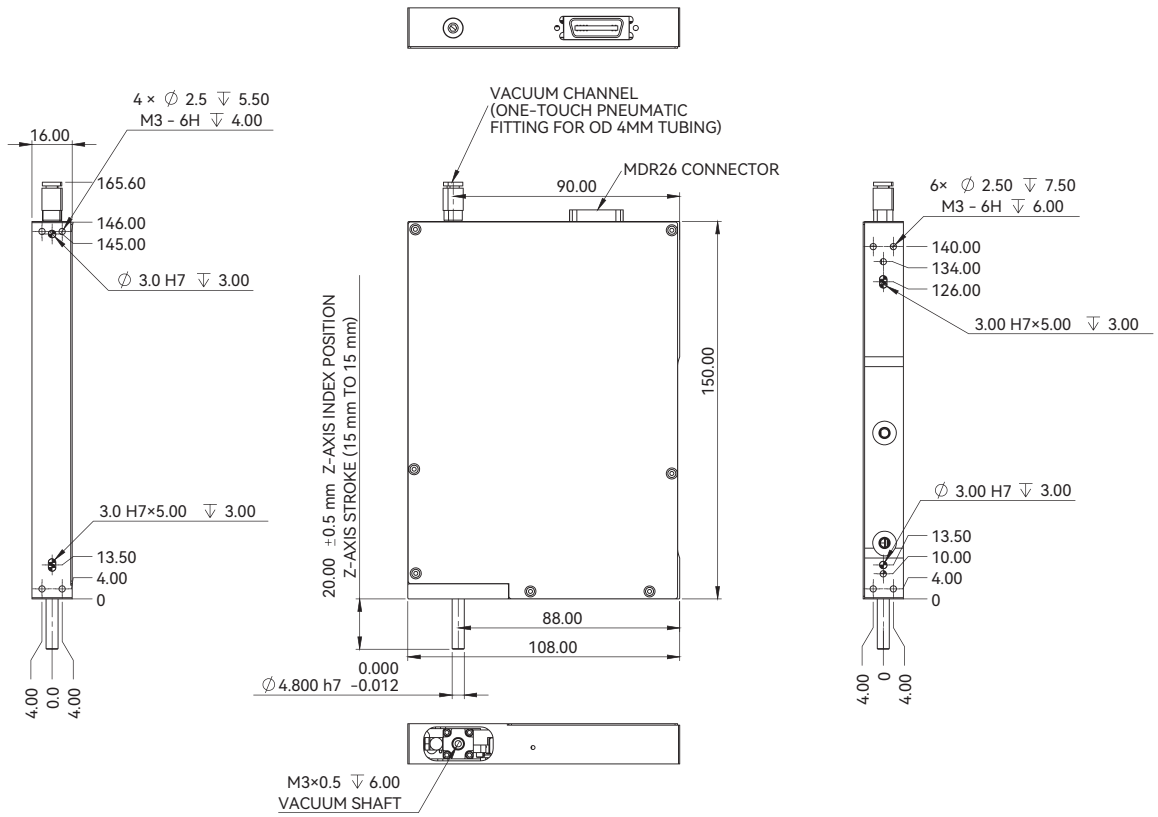


APC16B-Z30

Motor Specifications	Z-axis
Motor	ALM015-T-B1
Continuous Force (NC) @100℃ [Z-axis]❶	10 N
Peak Force [Z-axis]	36 N
Force Constant ±10% [Z-axis]	8.1 N/Arms
Back EMF Constant ±10%	6.6 Vpeak/(m/s)
Resistance (L-L) @25℃ ±10% [Z-axis]❷	4.51 Ω
Inductance (L-L) ±30% [Z-axis]❸	0.58 mH
Continuous Current (NC) @100℃❶	1.23 Arms
Peak Current	4.4 Arms
Max. Bus Voltage [Z-axis]	60 Vdc
Magnetic Period	16.5 mm
Attraction Force	-
Mechanical Specifications	**Z-axis**
Effective Stroke	30 mm
Resolution	0.5 µm
Repeatability	±5 µm
Rated Payload	0.04 kg
No-Load Moving Mass [Z-axis]	0.2 kg
No-Load Total Mass	0.8 kg
Max. Acceleration	20 m/s²
Max. Velocity	0.5 m/s
Max. Pressure	0.8 MPa
Suction Air Flow Requirement	≥ 8 L/min [ANR]

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Z-axis Motor

Performance Parameters	Unit	ALM015-T-B1
Continuous Force (NC) @100ºC [1]	N	10.0
Stall Force (NC) @100ºC [1][2]	N	8.3
Peak Force	N	36.0
Force Constant ±10%	N/Arms	8.1
Back EMF Constant ±10%	Vpeak/(m/s)	6.6
Motor Constant @25ºC	N/Sqrt(W)	3.1
Resistance (L-L) @25ºC ±10% [3]	Ω	4.51
Inductance (L-L) ±30% [4]	mH	0.58
Electrical Time Constant	ms	0.13
Continuous Current (NC) @100ºC [1][5]	Arms	1.23
Stall Current (NC) @100ºC [1][2]	Arms	1.03
Peak Current	Arms	4.4
Continuous Power Dissipation (NC) @100ºC [1]	W	13.3
Max. Coil Temperature	ºC	100.0
Thermal Dissipation Constant (NC) [1]	W/ºC	0.18
Max. Bus Voltage	Vdc	60.0
Magnetic Period	mm	16.5
Attration Force	N	0.0

[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Minimum heatsink area is 0.03m, and minimum speed is 10mm/s.
[3] Resistance is measured by DC current with standard 0.5m cable.
[4] Inductance is measured by current frequency of 1kHz.
[5] Maximum continuous current should be limited to 1.0 Arms due to connector limitation.
The contents of datasheet are subject to change without prior notice.

T-axis Motor

Performance Parameters	Unit	TP12
Continuous Torque (NC) @100ºC [1]	Nm	7.40E-03
Peak Torque	Nm	1.85E-02
Torque Constant ±10%	Nm/Arms	9.25E-03
Back EMF Constant ±10%	Vpeak/rpm	7.91E-04
Motor Constant @25ºC	Nm/Sqrt(W)	4.66E-03
Resistance (L-L) @25ºC ±10% [2]	Ω	2.63
Inductance (L-L) ±20% [3]	mH	0.23
Electrical Time Constant	ms	0.09
Continuous Current (NC) @100ºC [1]	Arms	0.80
Peak Current	Arms	2.00
Continuous Power Dissipation (NC) @100ºC [1]	W	3.25
Max. Coil Temperature	ºC	100.0
Thermal Dissipation Constant (NC) [1]	W/ºC	0.043
Max. Bus Voltage	Vdc	48.0
Pole Number	-	4
Max. Speed [4]	rpm	1000

[1] Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Minimum heatsink area is 0.03m, and minimum speed is 10mm/s.
[3] Resistance is measured by DC current with standard 0.5m cable.
[4] Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

Z-axis Linear Encoder

Specifications	ABI-21
Power Supply	5V ±10% 200mA (Max)
Output	TTL ABZ
Operating Temperature	0 ℃ to +70 ℃
Humidity	10 to 80% @ RH (Non-Condensing)
Shock (Non-Operating)	<1000 m/s², 6ms, ½ Sine
Vibration (Operating)	<100 m/s² Max @ 55 Hz to 2000 Hz
Scale Period	80 µm
Resolution	0.5 µm
Substrate Material	Nickel
Expansion Coefficient	14 ppm/ºC

T-axis Rotary Encoder

Specifications	ABI-2250 + INTERPOLATOR
Power Supply	5V ±5% 60mA (Typical)
Output	TTL ABZ
Operating Temperature	0 ℃ to +70 ℃
Humidity	10 to 80% @ RH (Non-Condensing)
Shock (Non-Operating)	<1000 m/s², 6ms, ½ Sine
Vibration (Operating)	<100 m/s² Max @ 55 Hz to 2000 Hz
Scale Period	80 µm
Resolution (2048x)	491520 counts/rev
Substrate Material	Aluminium
Expansion Coefficient	24 ppm/ºC

Ordering Part Number (OPN)

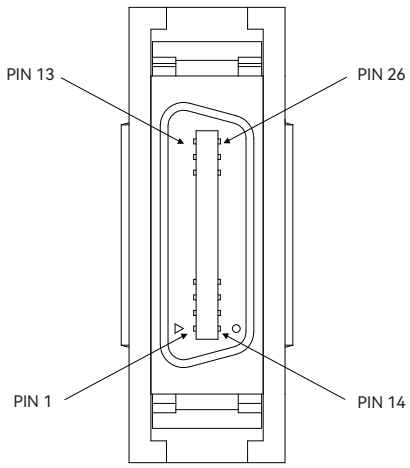
APC16B-Z30

Model:
APC16B

Axis & Effective Stroke:
Z30: Z-axis, 30mm
ZT30: Z-axis, 30mm/T-axis, limitless

Note:
★Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

APC16B-ZT30 & Z30 Pin Assignments

ENCODER CONNECTOR	PIN	SIGNAL
 26-pin MDR Receptacle Mating Option: 3M 10226-0210EC	1	Z_ENC_5V
	2	Z_ENC_0V
	3	Z_ENC_A+
	4	Z_ENC_A-
	5	Z_ENC_B+
	6	Z_ENC_B-
	7	Z_ENC_Z+
	8	Z_ENC_Z-
	9	NOT CONNECTED
	10	Z_ENC_0V
	11	Z_M1
	12	Z_M2
	13	Z_M3
	14	T_ENC_5V
	15	T_ENC_0V
	16	T_ENC_A+
	17	T_ENC_A-
	18	T_ENC_B+
	19	T_ENC_B-
	20	T_ENC_Z+
	21	T_ENC_Z-
	22	NOT CONNECTED
	23	PE
	24	T_M1
	25	T_M2
	26	T_M3

APK SERIES

- Z-axis 2G acceleration
- Up to 100mm stroke and 3-axis options
- Compact 3-axis design at only 16mm thick
- Linear axis repeatability up to ±1.5µm and rotary axis repeatability up to ±20arcsec
- Vacuum tip
- Force control ±1g (with recommended drivers)
- Compatible with APK-ME3 picker driver

EN-25.5.1

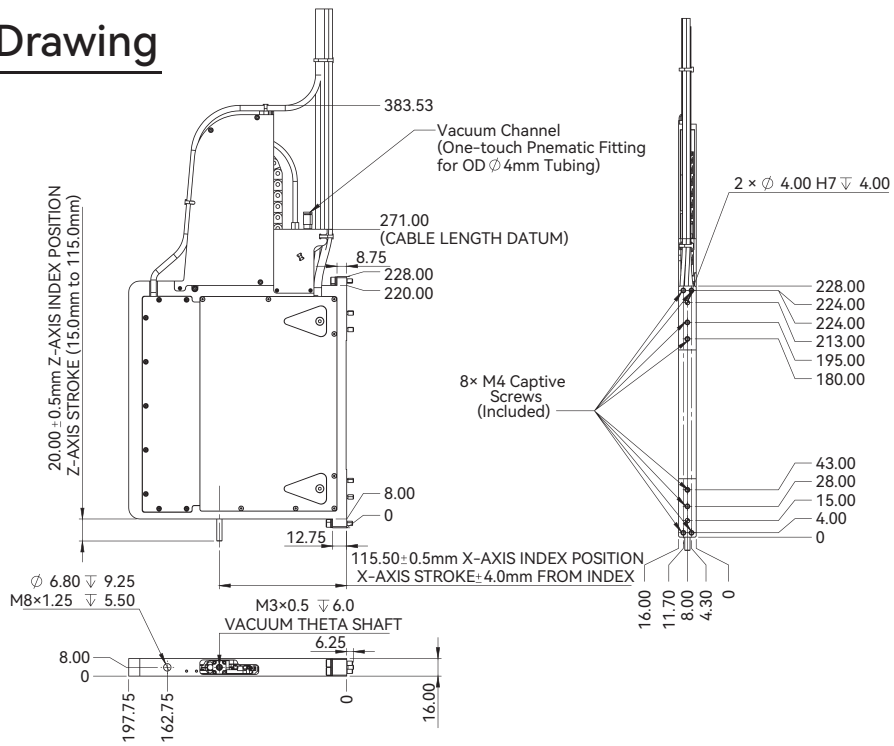
APK16-XZT100

Motor Specifications	X-axis	Z-axis	T-axis
Motor	AVA6-8-C54	APZ1-100	TP12
Continuous Force (NC) @100°C [X-axis ❶❷ | Z-axis ❶] Continuous Torque (NC) @100°C [T-axis ❶]	12.04 N	5.0 N	7.40E-03 Nm
Peak Force [X-axis ❷ | Z-axis] Peak Torque [T-axis]	36.1 N	14.9 N	1.85E-02 Nm
Force Constant ±10% [X-axis ❷ | Z-axis] Torque Constant ±10% [T-axis]	14.5 N/A	3.9 N/Arms	9.25E-03 Nm/Arms
Back EMF Constant ±10% ❷	14.5 V/(m/s)	3.2 Vpeak/(m/s)	7.91E-04 Vpeak/rpm
Resistance @25°C ±10% [X-axis ❸] Resistance (L-L) @25°C ±10% [Z-axis ❹ | T-axis ❹]	9.0 Ω	6.0 Ω	2.63 Ω
Inductance ±20% [X-axis ❺] Inductance (L-L) ±30% [Z-axis ❺] Inductance (L-L) ±20% [T-axis ❺]	4.04 mH	1.4 mH	0.23 mH
Continuous Current (NC) @100°C ❶	0.83 A	1.3 Arms	0.80 Arms
Peak Current	2.49 A	3.8 Arms	2.00 Arms
Max. Voltage [X-axis] Max. Bus Voltage [Z-axis | T-axis]	48 Vdc	48 Vdc	48 Vdc
Magnetic Period	-	17.1 mm	-
Pole Number	-	-	4
Mechanical Specifications			
Effective Stroke	8 mm	100mm	360° (Limitless)
Resolution	SINCOS	SINCOS	SINCOS
Repeatability	±1.5 μm	±2.5 μm	±20 arcsec
Rated Payload	0.02 kg		
No-Load Moving Mass [X-axis | Z-axis] No-Load Rotor Inertia [T-axis]	0.6 kg	0.3 kg	4.90E-08 kg·m²
No-Load Total Mass	2.1 kg		
Max. Acceleration	20 m/s²	20 m/s²	620 rad/s²
Max. Velocity	0.3 m/s	1.2 m/s	62 rad/s
Max. Pressure	0.8 MPa		

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Resistance is measured by DC current with standard 1.0m lead wire.
❺ Inductance is measured by current frequency of 1kHz.

The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



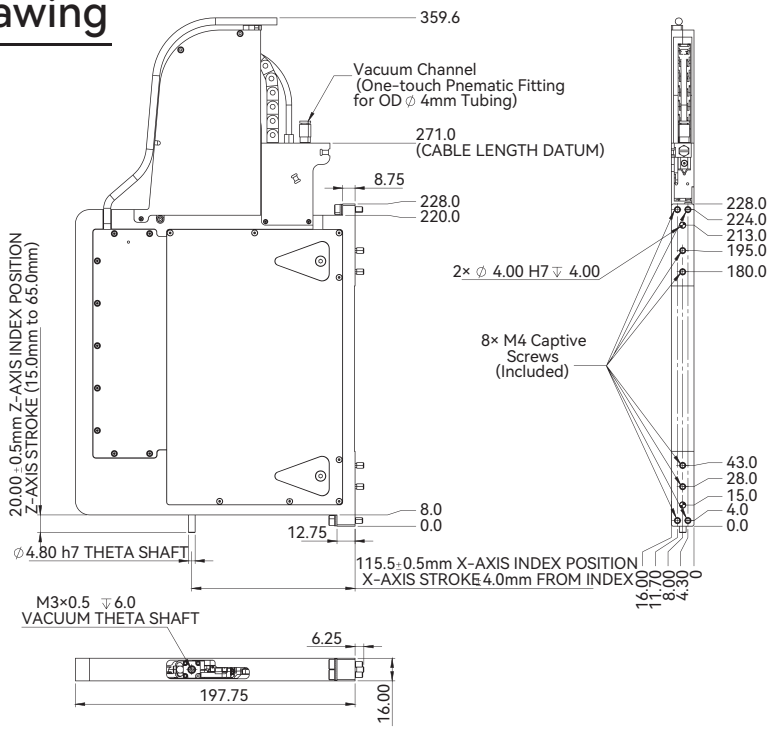
APK16-XZT50

Motor Specifications	X-axis	Z-axis	T-axis
Motor	AVA6-8-C54	APZ1-50	TP12
Continuous Force (NC) @100°C [X-axis | Z-axis] ❶❷❶ Continuous Torque (NC) @100°C [T-axis] ❶	12.04 N	5.0 N	7.40E-03 Nm
Peak Force [X-axis | Z-axis] ❷ Peak Torque [T-axis]	36.1 N	14.9 N	1.85E-02 Nm
Force Constant ±10% [X-axis | Z-axis] Torque Constant ±10% [T-axis] ❷	14.5 N/A	3.9 N/Arms	9.25E-03 Nm/Arms
Back EMF Constant ±10% ❷	14.5 V/(m/s)	3.2 Vpeak/(m/s)	7.91E-04 Vpeak/rpm
Resistance @25°C ±10% [X-axis] ❸ Resistance (L-L) @25°C ±10% [Z-axis | T-axis] ❹❹	9.0 Ω	4.8 Ω	2.63 Ω
Inductance ±20% [X-axis] ❺ Inductance (L-L) ±30% [Z-axis] ❺ Inductance (L-L) ±20% [T-axis] ❺	4.04 mH	1.1 mH	0.23 mH
Continuous Current (NC) @100°C ❶	0.83 A	1.3 Arms	0.80 Arms
Peak Current	2.49 A	3.8 Arms	2.00 Arms
Max. Voltage [X-axis] Max. Bus Voltage [Z-axis | T-axis]	48 Vdc	48 Vdc	48 Vdc
Magnetic Period	-	17.1 mm	-
Pole Number	-	-	4
Mechanical Specifications			
Effective Stroke	8 mm	50mm	360° (Limitless)
Resolution	SINCOS	SINCOS	SINCOS
Repeatability	±1.5 µm	±2 µm	±20 arcsec
Rated Payload	0.02 kg		
No-Load Moving Mass [X-axis | Z-axis] No-Load Rotor Inertia [T-axis]	0.6 kg	0.3 kg	4.90E-08 kg·m²
No-Load Total Mass	2.1 kg		
Max. Acceleration	20 m/s²	20 m/s²	620 rad/s²
Max. Velocity	0.3 m/s	0.8 m/s	62 rad/s
Max. Pressure	0.8 MPa		

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ The values are at mid stroke.
The contents of datasheet are subject to change without prior notice.

❸ Resistance is measured by DC current with standard 0.5m lead wire.
❹ Resistance is measured by DC current with standard 1.0m lead wire.
❺ Inductance is measured by current frequency of 1kHz.

Dimensional Drawing

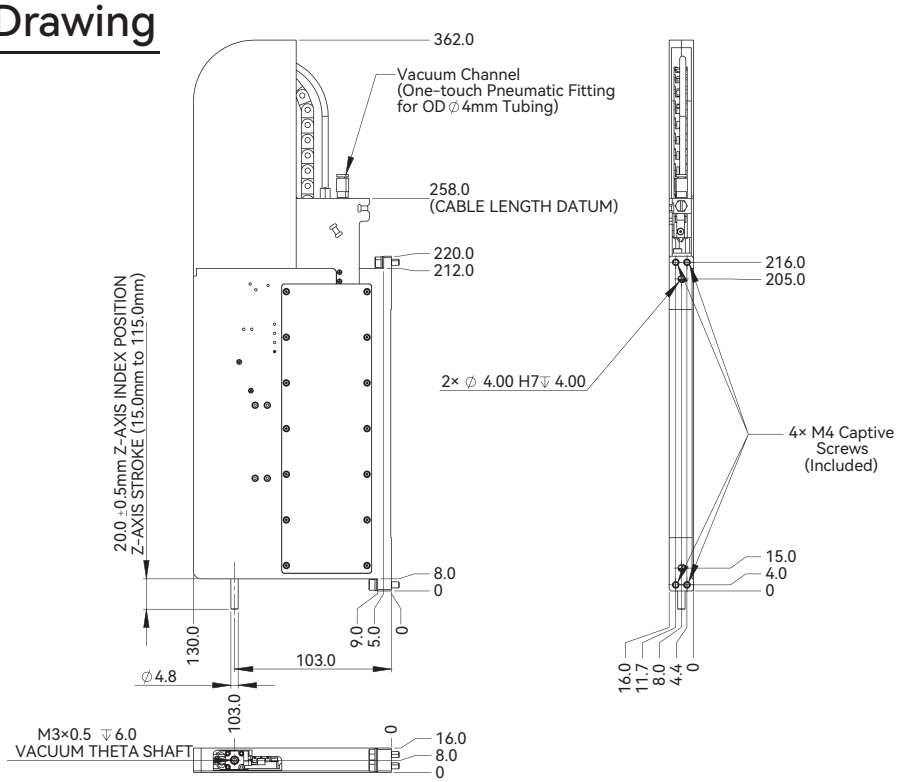


APK16-XZT100

Motor Specifications	Z-axis	T-axis
Motor	APZ2-100	TP12
Continuous Force (NC) @100°C [Z-axis] ❶ Continuous Torque (NC) @100°C [T-axis] ❶	6.4 N	7.40E-03 Nm
Peak Force [Z-axis] Peak Torque [T-axis]	18.9 N	1.85E-02 Nm
Force Constant ±10% [Z-axis] Torque Constant ±10% [T-axis]	5.0 N/Arms	9.25E-03 Nm/Arms
Back EMF Constant ± 10%	4.1 Vpeak/(m/s)	7.91E-04 Vpeak/rpm
Resistance (L-L) @25°C ±10% [Z-axis ❷ | T-axis ❷]	6.0 Ω	2.63 Ω
Inductance (L-L) ±30% [Z-axis] ❸ Inductance (L-L) ±20% [T-axis] ❸	1.4 mH	0.23 mH
Continuous Current (NC) @ 100°C ❶	1.3 Arms	0.80 Arms
Peak Current	3.8 Arms	2.00 Arms
Max. Bus Voltage [Z-axis | T-axis]	48 Vdc	48 Vdc
Magnetic Period	17.1 mm	-
Pole Number	-	4
Mechanical Specifications		
Effective Stroke	100 mm	360° (Limitless)
Resolution	SINCOS	SINCOS
Repeatability	±2.5 μm	±20 arcsec
Rated Payload	0.02 kg	
No-Load Moving Mass [Z-axis] No-Load Rotor Inertia [T-axis]	0.3 kg	4.90E-08 kg·m²
No-Load Total Mass	1.4 kg	
Max. Acceleration	20 m/s²	620 rad/s²
Max. Velocity	1.2 m/s	62 rad/s
Max. Pressure	0.8 MPa	

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 1.0m lead wire.
❸ Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

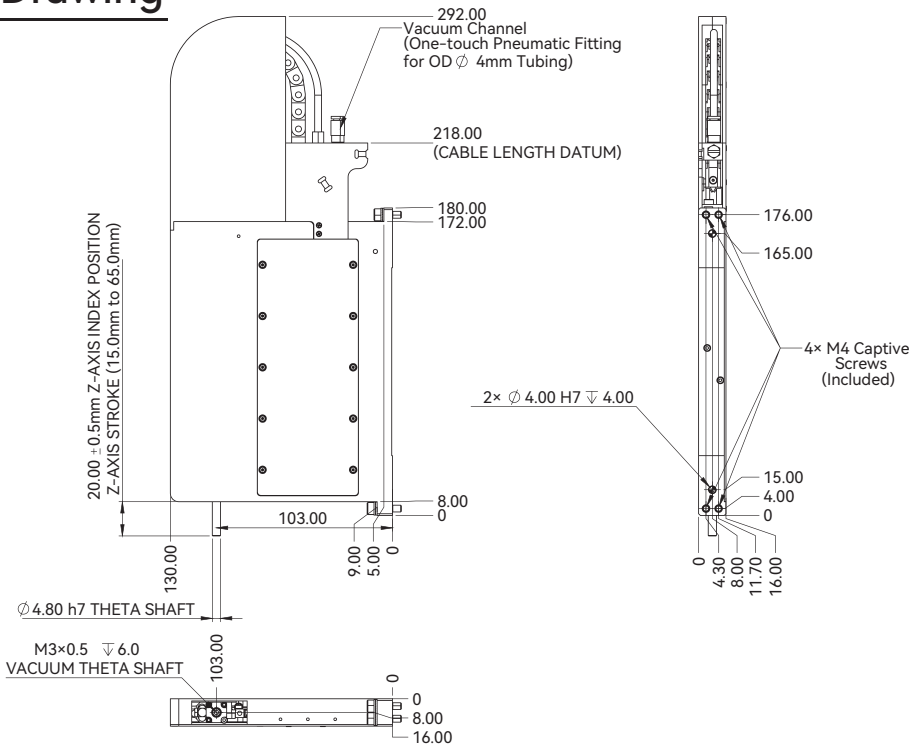


APK16-ZT50

Motor Specifications	Z-axis	T-axis
Motor	APZ2-50	TP12
Continuous Force (NC) @100°C [Z-axis] ❶ Continuous Torque (NC) @100°C [T-axis] ❶	6.4 N	7.40E-03 Nm
Peak Force [Z-axis] Peak Torque [T-axis]	18.9 N	1.85E-02 Nm
Force Constant ±10% [Z-axis] Torque Constant ±10% [T-axis]	5.0 N/Arms	9.25E-03 Nm/Arms
Back EMF Constant ± 10%	4.1 Vpeak/(m/s)	7.91E-04 Vpeak/rpm
Resistance (L-L) @25°C ±10% [Z-axis ❷ | T-axis ❷]	4.8 Ω	2.63 Ω
Inductance (L-L) ±30% [Z-axis] ❸ Inductance (L-L) ±20% [T-axis] ❸	1.1 mH	0.23 mH
Continuous Current (NC) @ 100°C ❶	1.3 Arms	0.80 Arms
Peak Current	3.8 Arms	2.00 Arms
Max. Bus Voltage [Z-axis | T-axis]	48 Vdc	48 Vdc
Magnetic Period	17.1 mm	-
Pole Number	-	4
Mechanical Specifications		
Effective Stroke	50 mm	360° (Limitless)
Resolution	SINCOS	SINCOS
Repeatability	±1.5 µm	±20 arcsec
Rated Payload	0.02 kg	
No-Load Moving Mass [Z-axis] No-Load Rotor Inertia [T-axis]	0.3 kg	4.90E-08 kg·m²
No-Load Total Mass	1.3 kg	
Max. Acceleration	20 m/s²	620 rad/s²
Max. Velocity	0.8 m/s	62 rad/s
Max. Pressure	0.8 MPa	

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 1.0m lead wire.
❸ Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

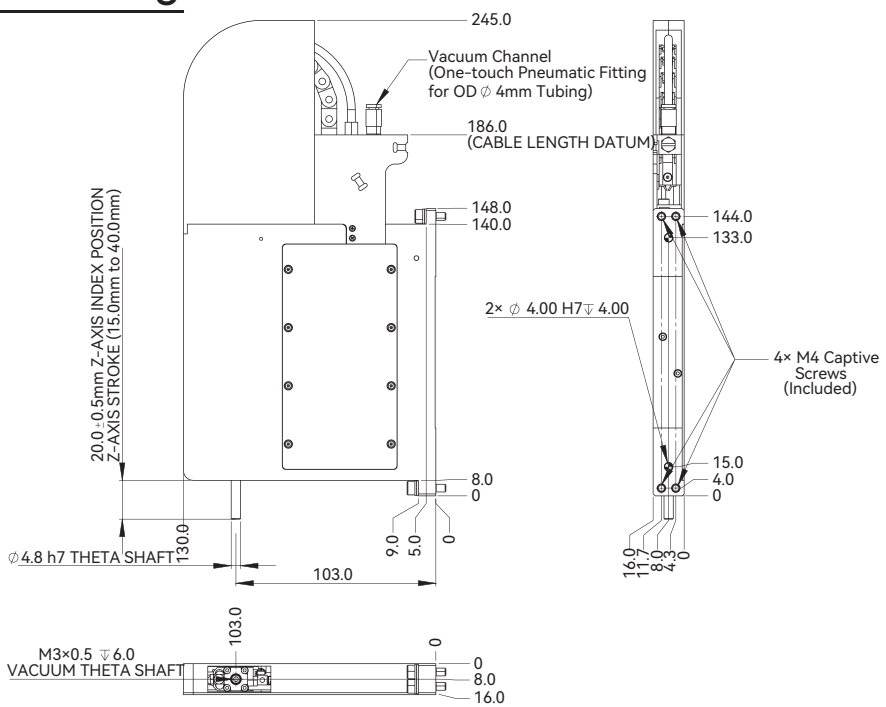


APK16-ZT25

Motor Specifications	Z-axis	T-axis
Motor	APZ2-25	TP12
Continuous Force (NC) @100°C [Z-axis] ❶ Continuous Torque (NC) @100°C [T-axis] ❶	6.4 N	7.40E-03 Nm
Peak Force [Z-axis] Peak Torque [T-axis]	18.9 N	1.85E-02 Nm
Force Constant ±10% [Z-axis] Torque Constant ±10% [T-axis]	5.0 N/Arms	9.25E-03 Nm/Arms
Back EMF Constant ± 10%	4.1 Vpeak/(m/s)	7.91E-04 Vpeak/rpm
Resistance (L-L) @25°C ±10% [Z-axis ❷ | T-axis ❷]	3.6 Ω	2.63 Ω
Inductance (L-L) ±30% [Z-axis] ❸ Inductance (L-L) ±20% [T-axis] ❸	0.8 mH	0.23 mH
Continuous Current (NC) @100°C ❶	1.3 Arms	0.80 Arms
Peak Current	3.8 Arms	2.00 Arms
Max. Bus Voltage [Z-axis | T-axis]	48 Vdc	48 Vdc
Magnetic Period	17.1 mm	-
Pole Number	-	4
Mechanical Specifications		
Effective Stroke	25 mm	360° (Limitless)
Resolution	SINCOS	SINCOS
Repeatability	±1.5 µm	±20 arcsec
Rated Payload	0.02 kg	
No-Load Moving Mass [Z-axis] No-Load Rotor Inertia [T-axis]	0.3 kg	4.90E-08 kg·m²
No-Load Total Mass	1.1 kg	
Max. Acceleration	20 m/s²	620 rad/s²
Max. Velocity	0.5 m/s	62 rad/s
Max. Pressure	0.8 MPa	

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 1.0m lead wire.
❸ Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing

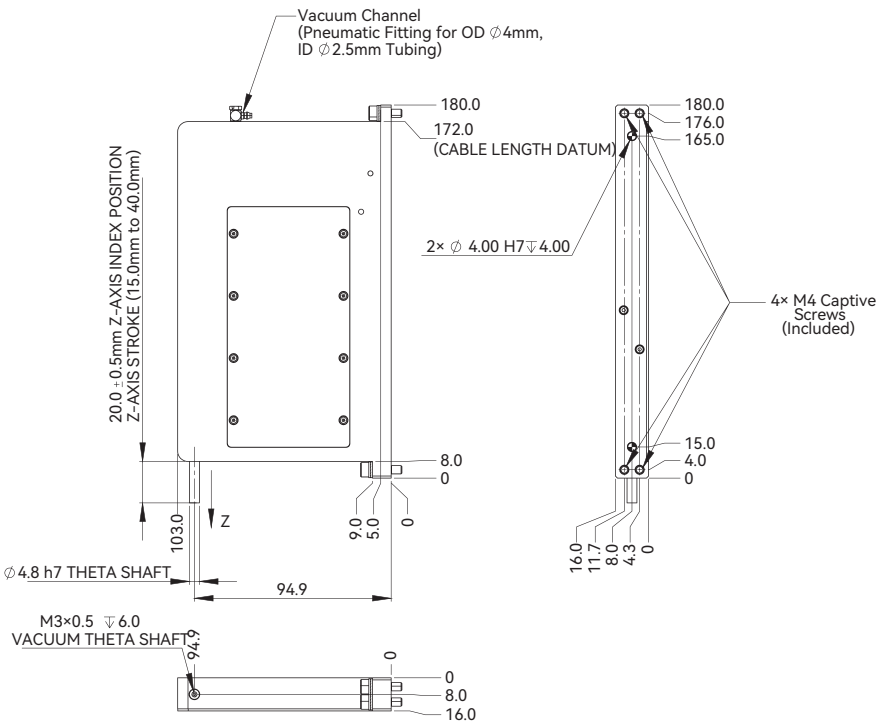


APK16-Z25

Motor Specifications	Z-axis
Motor	APZ2-25
Continuous Force (NC) @100°C [Z-axis] ❶	6.4 N
Peak Force [Z-axis]	18.9 N
Force Constant ±10% [Z-axis]	5.0 N/Arms
Back EMF Constant ±10%	4.1 Vpeak/(m/s)
Resistance (L-L) @25°C ±10% [Z-axis] ❷	3.6 Ω
Inductance (L-L) ±30% [Z-axis] ❸	0.8 mH
Continuous Current (NC) @100°C ❶	1.3 Arms
Peak Current	3.8 Arms
Max. Bus Voltage [Z-axis]	48 Vdc
Magnetic Period	17.1 mm
Pole Number	-
Mechanical Specifications	
Effective Stroke	25 mm
Resolution	SINCOS
Repeatability	±1.5 μm
Rated Payload	0.02 kg
No-Load Moving Mass [Z-axis]	0.2 kg
No-Load Total Mass	0.9 kg
Max. Acceleration	20 m/s²
Max. Velocity	0.5 m/s
Max. Pressure	0.8 MPa

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 1.0m lead wire.
❸ Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



X-axis Motor

Performance Parameters	Unit	AVA6-8-C54
Continuous Force (NC) @100°C ❶❷	N	12.04
Peak Force ❷	N	36.1
Force Constant ±10% ❷	N/A	14.5
Back EMF Constant ±10% ❷	V/(m/s)	14.5
Motor Constant @25°C ❷	N/Sqrt(W)	4.83
Resistance @25°C ±10% ❸	Ω	9.0
Inductance ±20% ❹	mH	4.04
Electrical Time Constant	ms	0.45
Continuous Current @100°C ❶	A	0.83
Peak Current	A	2.49
Continuous Power Dissipation @100°C ❶	W	8.0
Max. Coil Temperature	°C	100
Thermal Dissipation Constant ❶	W/°C	0.107
Max. Voltage	Vdc	48

❶Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷The values are at mid stroke.
❸Resistance is measured by DC current with standard 0.5m lead wire.
❹Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

T-axis Motor

Performance Parameters	Unit	TP12
Continuous Torque (NC) @100°C ❶	Nm	7.40E-03
Peak Torque	Nm	1.85E-02
Torque Constant ±10%	Nm/Arms	9.25E-03
Back EMF Constant ±10%	Vpeak/rpm	7.91E-04
Motor Constant @25°C	Nm/Sqrt(W)	4.66E-03
Resistance (L-L) @25°C ±10% ❷	Ω	2.63
Inductance (L-L) ±20% ❸	mH	0.23
Electrical Time Constant	ms	0.09
Continuous Current (NC) @100°C ❶	Arms	0.80
Peak Current	Arms	2.00
Continuous Power Dissipation (NC) @100°C ❶	W	3.25
Max. Coil Temperature	°C	100
Thermal Dissipation Constant (NC) ❶	W/°C	0.043
Max. Bus Voltage	Vdc	48
Pole Number	-	4
Max. Speed	rpm	1000

❶Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
❷Resistance is measured by DC current with standard 1.0m cable.
❸Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

Z-axis Motor

Performance Parameters	Unit	APZ1-100	APZ1-50	APZ2-100	APZ2-50	APZ2-25
Continuous Force (NC) @100°C ❶	N	5.0	5.0	6.4	6.4	6.4
Peak Force	N	14.9	14.9	18.9	18.9	18.9
Force Constant ±10%	N/Arms	3.9	3.9	5.0	5.0	5.0
Back EMF Constant ±10%	Vpeak/(m/s)	3.2	3.2	4.1	4.1	4.1
Motor Constant @25°C	N/Sqrt(W)	1.3	1.5	1.7	1.9	2.2
Resistance (L-L) @25°C ±10% ❷	Ω	6.0	4.8	6.0	4.8	3.6
Inductance (L-L) ±30% ❸	mH	1.4	1.1	1.4	1.1	0.8
Electrical Time Constant	ms	0.23	0.23	0.23	0.23	0.23
Continuous Current (NC) @100°C ❶	Arms	1.3	1.3	1.3	1.3	1.3
Peak Current	Arms	3.8	3.8	3.8	3.8	3.8
Continuous Power Dissipation (NC) @100°C ❶	W	18.7	14.9	18.7	14.9	11.2
Max. Coil Temperature	°C	100	100	100	100	100
Thermal Dissipation Constant (NC) ❶	W/°C	0.25	0.20	0.25	0.20	0.15
Max. Bus Voltage	Vdc	48	48	48	48	48
Magnetic Period	mm	17.1	17.1	17.1	17.1	17.1
Attraction Force	N	13.5	13.5	17.2	17.2	17.2

❶Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
❷Resistance is measured by DC current with standard 1.0m cable.
❸Inductance is measured by current frequency of 1kHz.
The contents of datasheet are subject to change without prior notice.

X&Z-axis Linear Encoder

Specifications	ABI-2270
Power Supply	5V DC ±5% 60mA (Typical)
Output	1Vpp, SIN/COS, INDEX
Operating Temperature	0 ℃ to +70 ℃
Humidity	10 to 80% @ RH (Non-Condensing)
Shock (Non-Operating)	<1000 m/s² , 6ms, ½ Sine, 3 Axes
Vibration (Operating)	<100 m/s² Max @ 55 Hz to 2000 Hz, 3 Axes
Scale Period	80 μm
Substrate Material	Nickel
Expansion Coefficient	14 ppm/ºC

T-axis Rotary Encoder

Specifications	ABI-2250
Power Supply	5V DC ±5% 60mA (Typical)
Output	1Vpp, SIN/COS, INDEX
Operating Temperature	0 ℃ to +70 ℃
Humidity	10 to 80% @ RH (Non-Condensing)
Shock (Non-Operating)	<1000 m/s² , 6ms, ½ Sine, 3 Axes
Vibration (Operating)	<100 m/s² Max @ 55 Hz to 2000 Hz, 3 Axes
Scale Period	80 μm
Lines Per Revolution	240
Substrate Material	Aluminium
Expansion Coefficient	24 ppm/ºC

Ordering Part Number (OPN)

APK16-XZT100E-A2A4-A4

Model:
APK16

Axis:
Z: 1-axis (Z-axis)❶
ZT: 2-axis (Z-axis, T-axis)
XZT: 3-axis (X-axis, Z-axis, T-axis)❷

Effective Stroke:
25: 25mm
50: 50mm
100: 100mm

Cover Type:
E: EN

Termination:❸
4: Motor: MATE-N-LOK/Encoder: DSUB 26 HD

Cable Length:
A: 0.5m

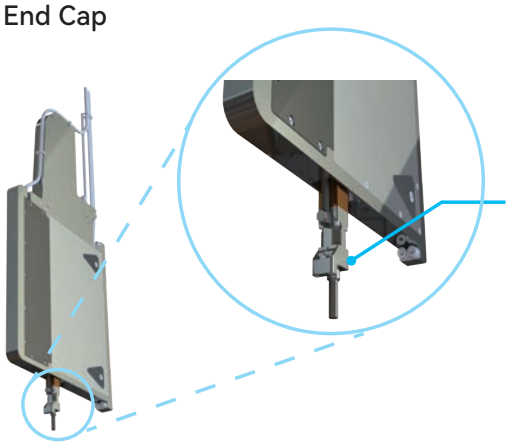
Scale Type:
4: Nickel, 14ppm/K

Encoder Type:
A2A: ABI-2270/ABI-2250, SINCOS (1Vpp)

Note:
❶1-axis (Z-axis) matches with Effective Stroke 25mm.
❷3-axes (X-axis, Z-axis, T-axis) matches with Effective Stroke 50mm and 100mm.
❸For China region, please consult the local contact for termination information.
★Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

APK Accessories

ESD End Cap



Features:

- Prevent electrostatic discharge (ESD) damage to machine / chip
- Allows grounding of < 10 Ohm

Note:

- ESD end effector/suction cup should be used
- Limited to 365 degree of rotation

Ordering Part Number (OPN)

APK16ACC-ESD

Model: APK16ACC

Accessory Type: ESD: ESD End Cap ❶

Note:

❶ Limited to 365 degree of rotation.

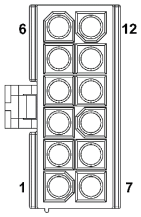
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

APK Module Cable Length Determination

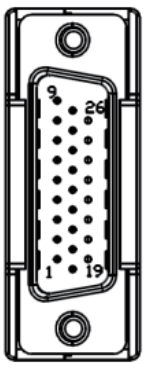
Note:

★ Both motor and encoder cable lengths are measured from the cable length datum point indicated in the dimensional drawings.

APK16-XZT100 & XZT50 Pin Assignments

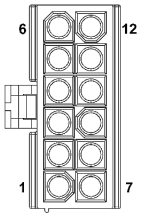
MOTOR CONNECTOR	PIN	SIGNAL	REMARKS
	1	X_M1	X MOTOR POWER SUPPLY 1
	2	X_M2	X MOTOR POWER SUPPLY 2
	3	Z_M1	Z MOTOR PHASE 1
	4	Z_M2	Z MOTOR PHASE 2
	5	T_M1	T MOTOR PHASE 1
	6	T_M2	T MOTOR PHASE 2
	7	NC	NOT CONNECTED
	8	NC	NOT CONNECTED
	9	Z_M3	Z MOTOR PHASE 3
	10	Z_PE	Z MOTOR GROUND
	11	T_M3	T MOTOR PHASE 3
	12	NC	NOT CONNECTED

Part number: TE Connectivity 770581-1 & 1-770902-1
Mating Part number: TE Connectivity 794199-1 & 1-794226-0
Mating Part description: 12P MINI UMNL2 CAP HSG DBLROW & MINI UMNL PIN 26-22 AWG AU LF

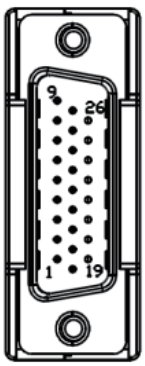
ENCODER CONNECTOR	PIN	SIGNAL	REMARKS
	1	NC	NOT CONNECTED
	2	X_SIN+	X ENCODER SIN NON-INVERTED
	3	X_COS+	X ENCODER COS NON-INVERTED
	4	Z_INDEX+	Z ENCODER INDEX NON-INVERTED
	5	Z_SIN+	Z ENCODER SIN NON-INVERTED
	6	Z_COS+	Z ENCODER COS NON-INVERTED
	7	T_INDEX+	T ENCODER INDEX NON-INVERTED
	8	T_SIN+	T ENCODER SIN NON-INVERTED
	9	T_COS+	T ENCODER COS NON-INVERTED
	10	X_INDEX+	X ENCODER INDEX NON-INVERTED
	11	X_INDEX-	X ENCODER INDEX INVERTED
	12	X_SIN-	X ENCODER SIN INVERTED
	13	X_COS-	X ENCODER COS INVERTED
	14	Z_INDEX-	Z ENCODER INDEX INVERTED
	15	Z_SIN-	Z ENCODER SIN INVERTED
	16	Z_COS-	Z ENCODER COS INVERTED
	17	T_INDEX-	T ENCODER INDEX INVERTED
	18	T_SIN-	T ENCODER SIN INVERTED
	19	X_+5V	X ENCODER POWER SUPPLY
	20	X_0V	X ENCODER POWER SUPPLY RETURN
	21	Z_+5V	Z ENCODER POWER SUPPLY
	22	Z_0V	Z ENCODER POWER SUPPLY RETURN
	23	T_+5V	T ENCODER POWER SUPPLY
	24	T_0V	T ENCODER POWER SUPPLY RETURN
	25	NC	NOT CONNECTED
	26	T_COS-	T ENCODER COS INVERTED

Part number: Amphenol L717HDA26P
Mating Part number: Amphenol 10090770-S264ALF
Mating Part description: HIGH DENSITY D SUB, RECEPTACLE, 26 POSITION FEMALE

APK16-ZT100, ZT50 & ZT25 Pin Assignments

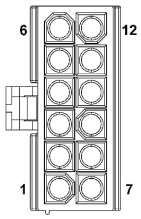
MOTOR CONNECTOR	PIN	SIGNAL	REMARKS
	1	NC	NOT CONNECTED
	2	NC	NOT CONNECTED
	3	Z_M1	Z MOTOR PHASE 1
	4	Z_M2	Z MOTOR PHASE 2
	5	T_M1	T MOTOR PHASE 1
	6	T_M2	T MOTOR PHASE 2
	7	NC	NOT CONNECTED
	8	NC	NOT CONNECTED
	9	Z_M3	Z MOTOR PHASE 3
	10	Z_PE	Z MOTOR GROUND
	11	T_M3	T MOTOR PHASE 3
	12	NC	NOT CONNECTED

Part number: TE Connectivity 770581-1 & 1-770902-1
Mating Part number: TE Connectivity 794199-1 & 1-794226-0
Mating Part description: 12P MINI UMNL2 CAP HSG DBLROW & MINI UMNL PIN 26-22 AWG AU LF

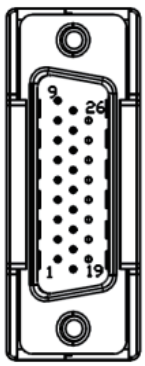
ENCODER CONNECTOR	PIN	SIGNAL	REMARKS
	1	NC	NOT CONNECTED
	2	NC	NOT CONNECTED
	3	NC	NOT CONNECTED
	4	Z_INDEX+	Z ENCODER INDEX NON-INVERTED
	5	Z_SIN+	Z ENCODER SIN NON-INVERTED
	6	Z_COS+	Z ENCODER COS NON-INVERTED
	7	T_INDEX+	T ENCODER INDEX NON-INVERTED
	8	T_SIN+	T ENCODER SIN NON-INVERTED
	9	T_COS+	T ENCODER COS NON-INVERTED
	10	NC	NOT CONNECTED
	11	NC	NOT CONNECTED
	12	NC	NOT CONNECTED
	13	NC	NOT CONNECTED
	14	Z_INDEX-	Z ENCODER INDEX INVERTED
	15	Z_SIN-	Z ENCODER SIN INVERTED
	16	Z_COS-	Z ENCODER COS INVERTED
	17	T_INDEX-	T ENCODER INDEX INVERTED
	18	T_SIN-	T ENCODER SIN INVERTED
	19	NC	NOT CONNECTED
	20	NC	NOT CONNECTED
	21	Z_+5V	Z ENCODER POWER SUPPLY
	22	Z_0V	Z ENCODER POWER SUPPLY RETURN
	23	T_+5V	T ENCODER POWER SUPPLY
	24	T_0V	T ENCODER POWER SUPPLY RETURN
	25	NC	NOT CONNECTED
	26	T_COS-	T ENCODER COS INVERTED

Part number: Amphenol L717HDA26P
Mating Part number: Amphenol 10090770-S264ALF
Mating Part description: HIGH DENSITY D SUB, RECEPTACLE, 26 POSITION FEMALE

APK16-Z25 Pin Assignments

MOTOR CONNECTOR	PIN	SIGNAL	REMARKS
	1	NC	NOT CONNECTED
	2	NC	NOT CONNECTED
	3	Z_M1	Z MOTOR PHASE 1
	4	Z_M2	Z MOTOR PHASE 2
	5	NC	NOT CONNECTED
	6	NC	NOT CONNECTED
	7	NC	NOT CONNECTED
	8	NC	NOT CONNECTED
	9	Z_M3	Z MOTOR PHASE 3
	10	Z_PE	Z MOTOR GROUND
	11	NC	NOT CONNECTED
	12	NC	NOT CONNECTED

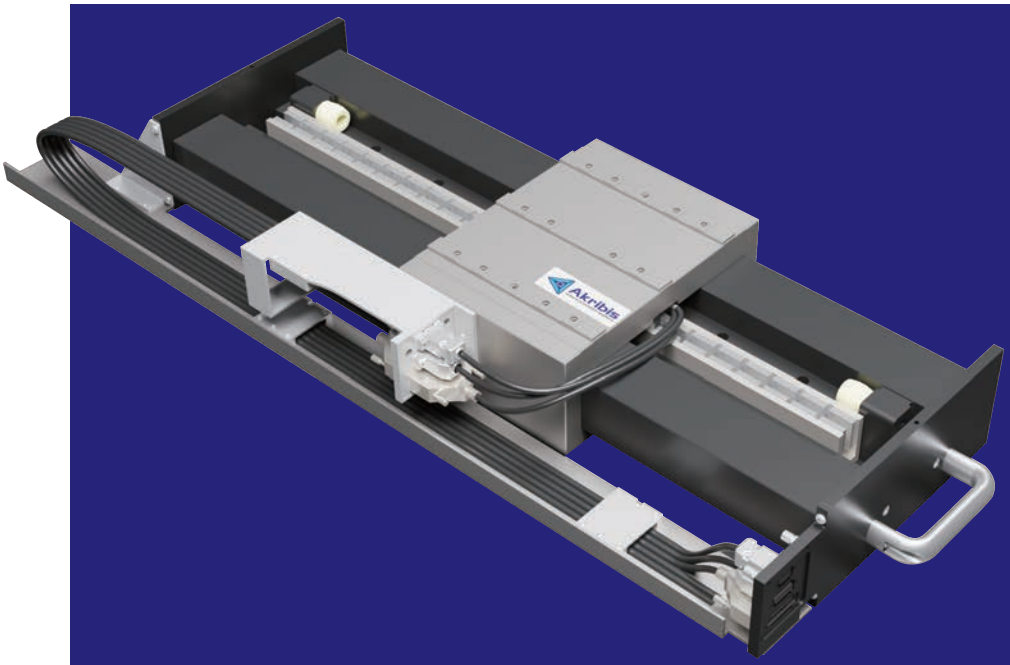
Part number: TE Connectivity 770581-1 & 1-770902-1
Mating Part number: TE Connectivity 794199-1 & 1-794226-0
Mating Part description: 12P MINI UMNL2 CAP HSG DBLROW & MINI UMNL PIN 26-22 AWG AU LF

ENCODER CONNECTOR	PIN	SIGNAL	REMARKS
	1	NC	NOT CONNECTED
	2	NC	NOT CONNECTED
	3	NC	NOT CONNECTED
	4	Z_INDEX+	Z ENCODER INDEX NON-INVERTED
	5	Z_SIN+	Z ENCODER SIN NON-INVERTED
	6	Z_COS+	Z ENCODER COS NON-INVERTED
	7	NC	NOT CONNECTED
	8	NC	NOT CONNECTED
	9	NC	NOT CONNECTED
	10	NC	NOT CONNECTED
	11	NC	NOT CONNECTED
	12	NC	NOT CONNECTED
	13	NC	NOT CONNECTED
	14	Z_INDEX-	Z ENCODER INDEX INVERTED
	15	Z_SIN-	Z ENCODER SIN INVERTED
	16	Z_COS-	Z ENCODER COS INVERTED
	17	NC	NOT CONNECTED
	18	NC	NOT CONNECTED
	19	NC	NOT CONNECTED
	20	NC	NOT CONNECTED
	21	Z_+5V	Z ENCODER POWER SUPPLY
	22	Z_0V	Z ENCODER POWER SUPPLY RETURN
	23	NC	NOT CONNECTED
	24	NC	NOT CONNECTED
	25	NC	NOT CONNECTED
	26	NC	NOT CONNECTED

Part number: Amphenol L717HDA26P
Mating Part number: Amphenol 10090770-S264ALF
Mating Part description: HIGH DENSITY D SUB, RECEPTACLE, 26 POSITION FEMALE

AIR BEARING MODULES

AIR BEARING MODULES



AAL SERIES

- Frictionless guidance with high stiffness aerostatic bearings for the ultimate in smooth scanning motion
- Excellent geometric accuracy (straightness, flatness and angular accuracy) for demanding positioning applications
- Fully non-contact bearings, motors, and encoders eliminate wear and allows for stable maintenance-free performance
- Integrated stage cable management and modular XY stacking system eases integration
- Suitable for applications in semiconductor inspection and metrology, laser micromachining, diamond turning etc

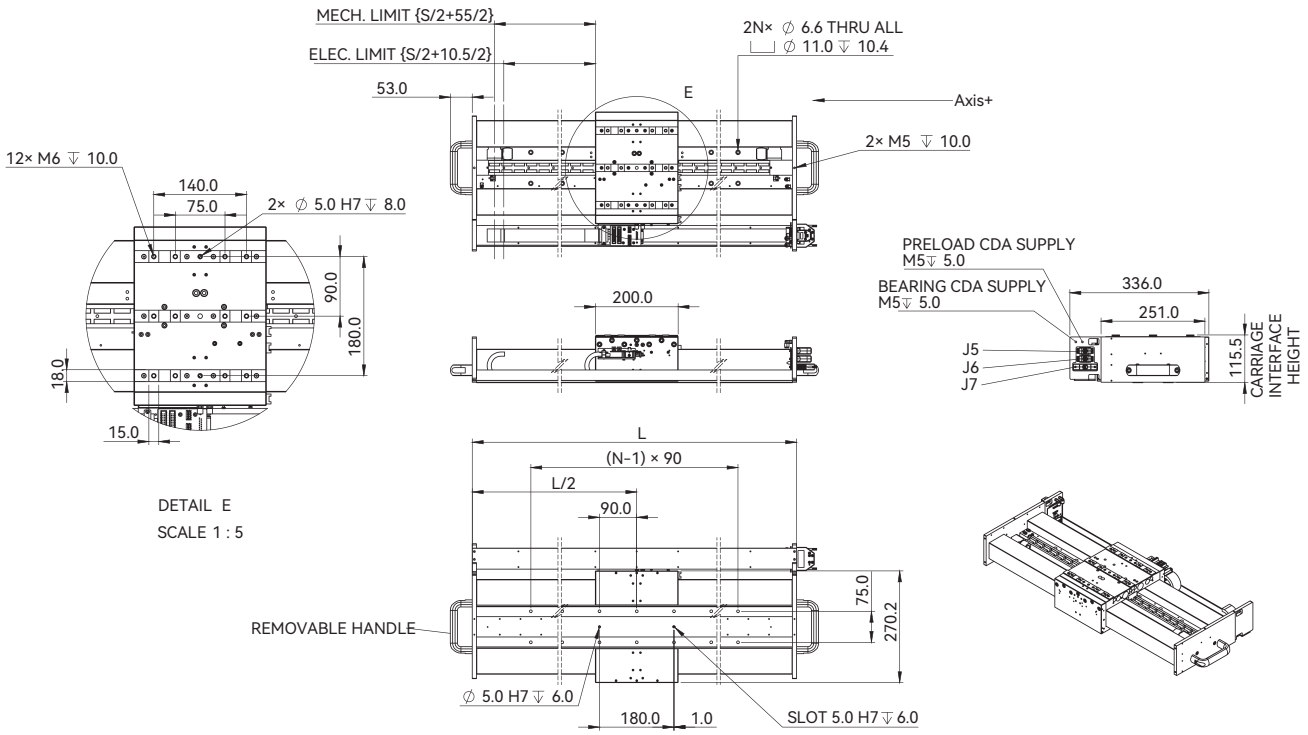
AAL270

Motor Specifications	Unit	Unshielded Cable Variant AAL270-X-XX-XX-X-A-X	Shielded Cable Variant AAL270-X-XX-XX-X-B-X
Motor	-	AUM3-P-S3	AUM3-P-S3
Continuous Force (NC) @100°C [1]	N	85	85
Peak Force	N	433	433
Force Constant ±10%	N/Arms	23.6	23.6
Back EMF Constant ±10%	Vpeak/(m/s)	19.2	19.2
Resistance (L-L) @25°C ±10% [2]	Ω	3.3	3.3
Inductance (L-L) ±40% [3]	mH	2.62	2.62
Continuous Current (NC) @100°C [1]	Arms	3.6	3.6
Peak Current	Arms	18.4	18.4
Max. Bus Voltage [4]	Vdc	100	330
Magnetic Period	mm	60	60

Mechanical Specifications [5]	Unit	100 mm	200 mm	300 mm	400 mm	500 mm
Resolution	μm	SINCOS	SINCOS	SINCOS	SINCOS	SINCOS
Accuracy (With Mapping)	μm	±0.2	±0.4	±0.4	±0.5	±0.5
Bidirectional Repeatability (ISO230-2)	μm	±0.075	±0.1	±0.15	±0.2	±0.2
Flatness	μm	±0.4	±0.5	±0.75	±1.5	±2.0
Straightness	μm	±0.4	±0.5	±0.75	±1.5	±2.0
Roll	arcsec	±1	±2	±3	±4	±5
Pitch	arcsec	±1	±2	±3	±4	±5
Yaw	arcsec	±1	±2	±3	±4	±5
Rated Payload	kg	40				
Max. No-Load Acceleration	m/s^2	20				
Max. No-Load Velocity	m/s	1.0				
Unloaded Moving Mass (Unshielded Cable Variants) AAL270-X-XX-XX-X-A-X	kg	7.3				
Unloaded Moving Mass (Shielded Cable Variants) AAL270-X-XX-XX-X-B-X	kg	7.7				
Unloaded Total Mass, Single Axis (Unshielded Cable Variants) AAL270-X-XX-XX-X-A-X	kg	22.7	26.0	29.3	32.5	35.8
Unloaded Total Mass, Single Axis (Shielded Cable Variants) AAL270-X-XX-XX-X-B-X	kg	23.8	27.2	30.6	33.9	37.3
Operational Ambient Temperature Range	℃	10~40				

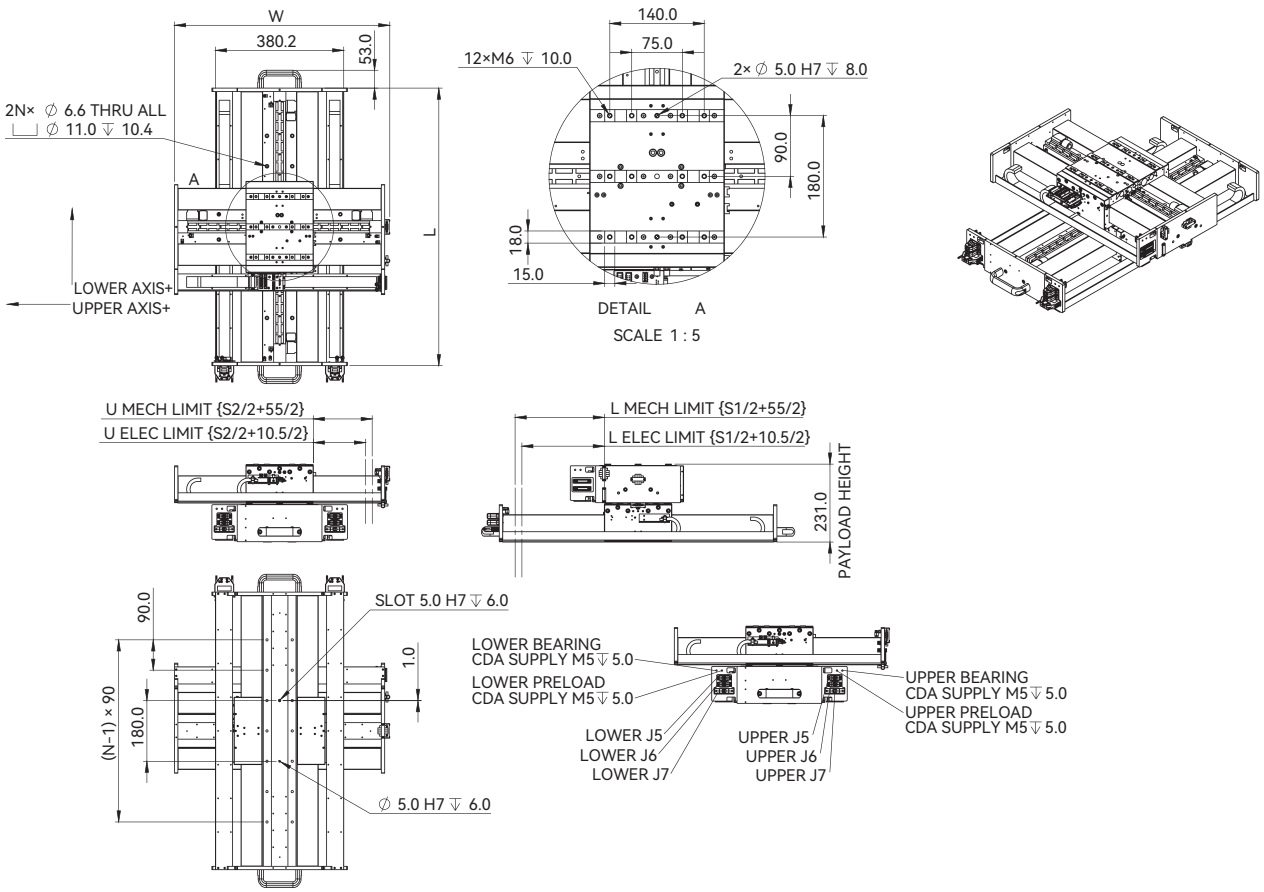
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5m lead wire.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
[4] Max. bus voltage of the unshielded cable variants is only 100V.
[5] Mechanical specifications refer to single-axis modules. For XY-axis stage, contact Akribis (cust-service@akribis-sys.com).
The contents of datasheet are subject to change without prior notice.

Unshielded Cable Variant – Single Axis (AAL270-X-XX-XX-X-A-X) Dimensional Drawing



Nom. Stroke, S (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Module Mass (kg)	Moving Mass (kg)
100	3	423	22.7	7.3
200	3	523	26.0	
300	5	623	29.3	
400	5	723	32.5	
500	7	823	35.8	

Unshielded Cable Variant – XY-Axis (AAL270-X-XX-XX-X-A-X) Dimensional Drawing



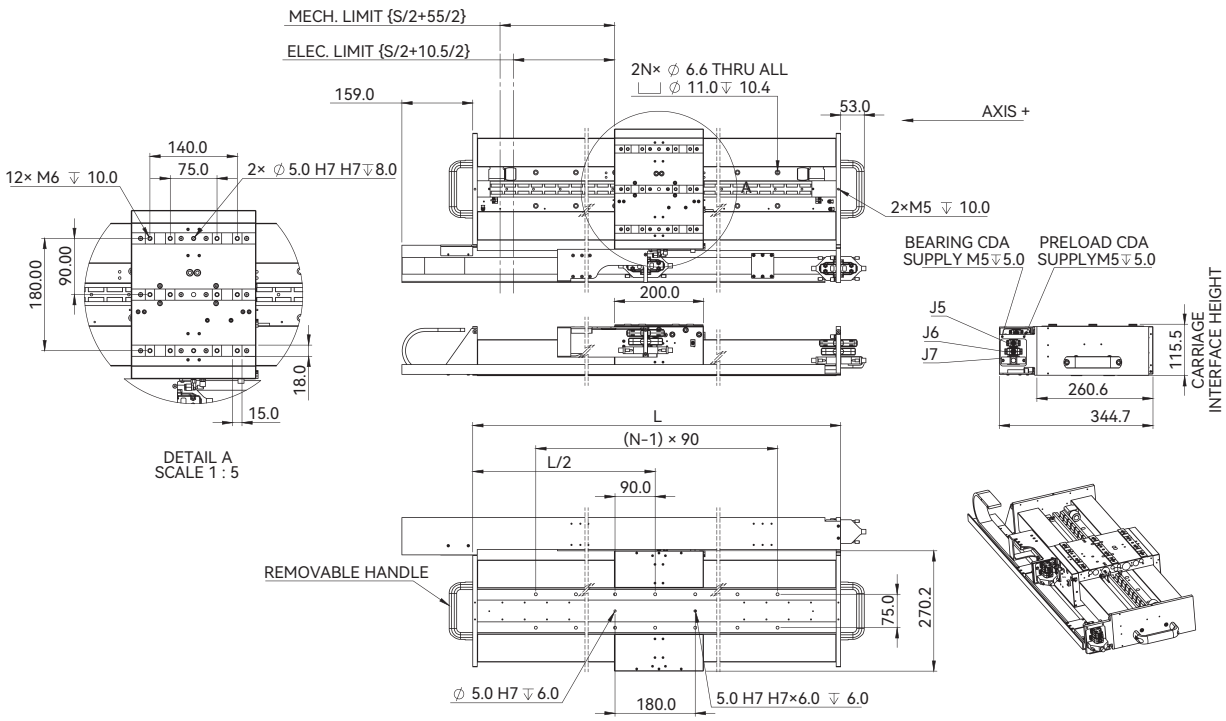
Upper Nom. Stroke, S2 (mm)	Module Width, W (mm)	Upper Module Mass (kg)
100	439	22.8
200	539	26.0
300	639	29.3

Lower Nom. Stroke, S1 (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Lower Module Mass (kg)
100	3	423	23.5
200	3	523	26.8
300	5	623	30.1
400	5	723	33.4
500	7	823	36.8

Note:

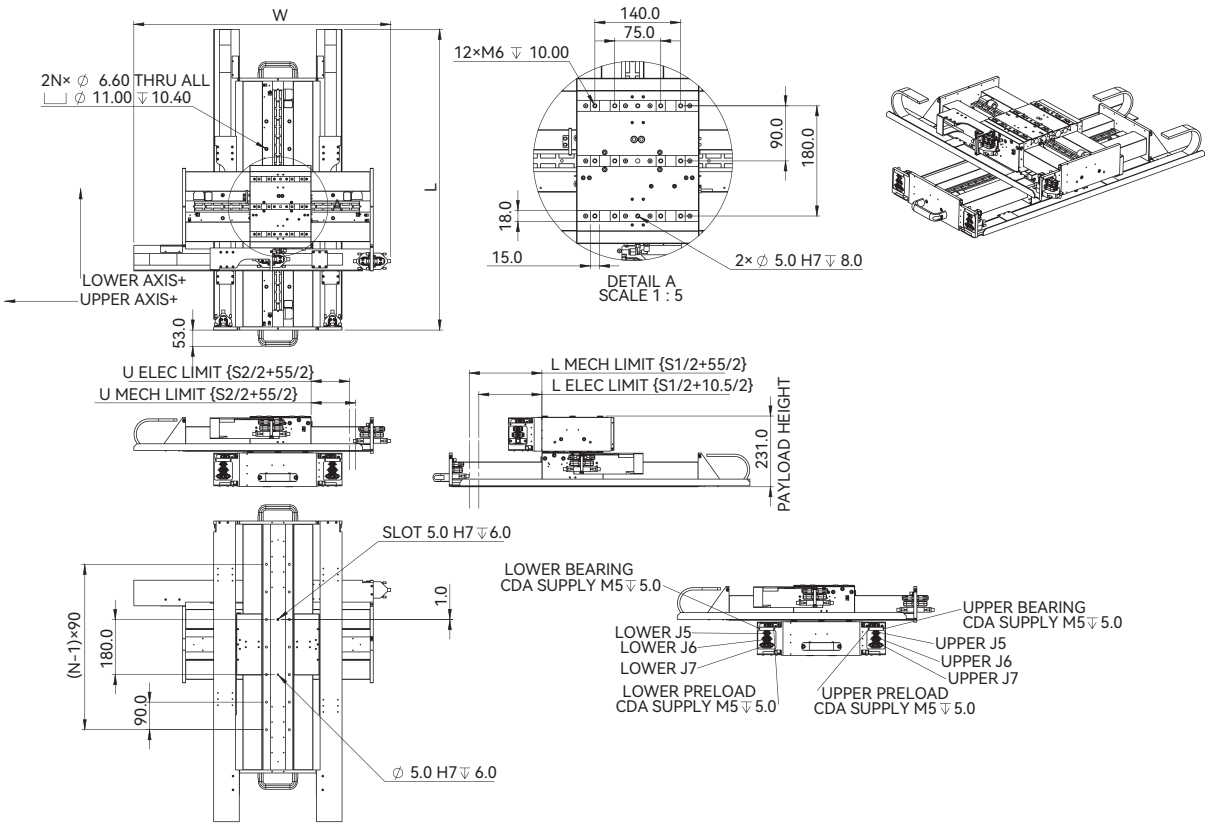
★ All modules unloaded moving mass = 7.3 kg

Shielded Cable Variant – Single Axis (AAL270-X-XX-XX-X-B-X) Dimensional Drawing



Nom. Stroke, S (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Module Mass (kg)	Moving Mass (kg)
100	3	423	23.5	7.7
200	3	523	26.8	
300	5	623	30.6	
400	5	723	33.4	
500	7	823	36.8	

Shielded Cable Variant - XY-Axis (AAL270-X-XX-XX-X-B-X) Dimensional Drawing



Upper Nom. Stroke, S2 (mm)	Module Width, W (mm)	Upper Module Mass (kg)
100	668	23.9
200	768	27.3
300	868	30.7

Lower Nom. Stroke, S1 (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Lower Module Mass (kg)
100	3	682	25.6
200	3	682	29.2
300	5	782	32.7
400	5	882	36.3
500	7	982	39.8

Note:

★ All modules unloaded moving mass = 7.7 kg

Ordering Part Number (OPN)

AAL270-B-10P-ACA2-S-A5

- **Model:** AAL270
- **Finish:** B: Black Anodized; E: EN
- **Effective Stroke:** 10: 100mm; 20: 200mm; 30: 300mm; 40: 400mm; 50: 500mm
- **Precision Grade:** P: Precision
- **Encoder Type:** ACA: ABI-51G, SINCOS (1Vpp); R4A: TONiC, SINCOS (1Vpp)
- **Scale Type:** 2: Glass G8 Soda Lime, 8ppm/K❷; 3: Glass G0 Robax/Zerodur, 0ppm/K❷; A: Zeromet/Invar, 0.75ppm/K❶
- **Cable Configuration:** S: Single Axis; L: XY Stack, Lower Axis; U: XY Stack, Upper axis
- **Cable Type:** A: Unshielded Cable Variants❸; B: Shielded Cable Variants
- **Stage Interface Connectors:** 2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall & Limit Switch: DSUB 9❺; 5: Motor: DSUB 9W4/Encoder: DSUB 15/Limit Switch: DSUB 15❹

AAL270-B-10UP-H2A2-S-A5

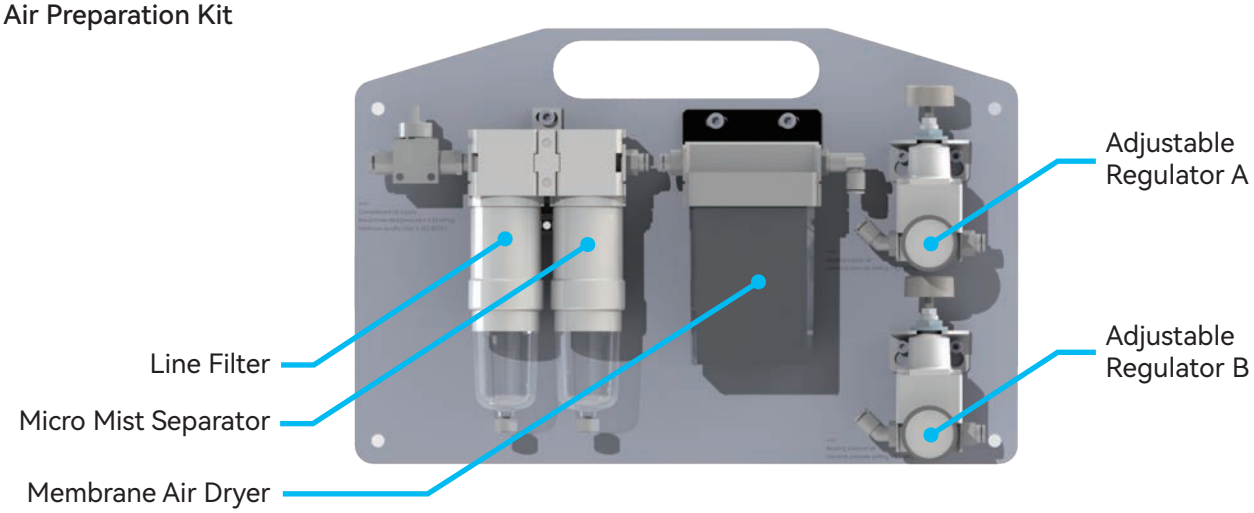
- **Model:** AAL270
- **Finish:** B: Black Anodized; E: EN
- **Effective Stroke:** 10: 100mm; 20: 200mm; 30: 300mm; 40: 400mm; 50: 500mm
- **Precision Grade:** UP: Ultraprecision
- **Encoder Type:** H2A: LIF4, SINCOS (1Vpp)
- **Scale Type:** 2: Glass G8 Soda Lime, 8ppm/K❷; 3: Glass G0 Robax/Zerodur, 0ppm/K❷
- **Cable Configuration:** S: Single Axis; L: XY Stack, Lower Axis; U: XY Stack, Upper axis
- **Cable Type:** A: Unshielded Cable Variants❸; B: Shielded Cable Variants
- **Stage Interface Connectors:** 2: Motor: DSUB 9W4/Encoder: DSUB 15/Hall & Limit Switch: DSUB 9❺; 5: Motor: DSUB 9W4/Encoder: DSUB 15/Limit Switch: DSUB 15❹

Note:

❶ R4A encoder option compatible with A scale option only.
❷ ACA and H2A encoder options compatible with 2 or 3 scale options only.
❸ A cable type option compatible with ACA encoder option only.
❹ A cable type option compatible with 5 stage interface connectors option only (Hall sensor not exposed).
❺ B cable type option compatible with 2 stage interface connectors option only.
★ Products can be customized to suit specific working environments, please contact cust-service@akribis-sys.com.

AAL Accessories

Air Preparation Kit



Features:

- Line Filter
  - -Large dust particle filtration and water droplet separation
  - -Nominal filtration rating: 1μm
  - -Filtration efficiency: 99%
  - -Water droplet removal ratio: 99%
- Micro Mist Separator
  - -Dust filtration, Oil mist separation
  - -Nominal filtration rating: 0.01μm
  - -Filtration efficiency: 99.9%
  - -Oil mist concentration on the outlet side: Max. 0.1mg/m³ [≈ 0.08 ppm]
- Membrane Air Dryer
  - -Outlet air atmosphere pressure dew point is ≤-20°C
- Adjustable Regulator A
  - -Adjust outlet air pressure from 0~1MPa, minimum precision: 0.04MPa
- Adjustable Regulator B
  - -Adjust outlet air pressure from 0~0.2MPa, minimum precision: 0.01MPa

Ordering Part Number (OPN)

AALACC-AIRPREP

Model:
AALACC

Accessory Type:
AIRPREP: Air Preparation Kit

XY Stack Integration and Calibration

AAL270 air bearing stage XY stack orthogonality calibration service provides the following options based on your perpendicularity requirements:

AALACC-XYN

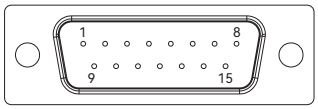
Model:
AALACC

Accessory Type:
XYN: XY Stack Integration, Non-precision, Orthogonality Not Measured
XY5: XY Stack Integration and Calibration, 5 arcsec Orthogonality
XY10: XY Stack Integration and Calibration, 10 arcsec Orthogonality

Note:
★Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

Unshielded Cable Variants Connectors (AAL270-X-XX-XX-X-A-X)

J5: ENCODER CONNECTOR



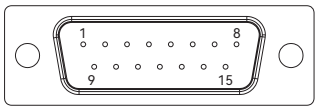
DA-15 MALE
CONTACT FINISH: GOLD
SHELL FINISH: NICKEL
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- NORCOMP 171-015-202 OR
- NORCOMP 171-015-203 OR
- 3M 8315-7000

ENCODER VERSION	SIGNAL OUTPUT	SIGNAL PERIOD (µm)
AAL270-x-xxx-ACA-x-x-x	SINCOS 1Vpp	20

PIN	SIGNAL	REMARKS
1	COS-	ENCODER COS INVERTED
2	SIN-	ENCODER SIN INVERTED
3	INDEX+	ENCODER INDEX NON-INVERTED
4	+5V	ENCODER POWER SUPPLY
5	RESERVED	DO NOT CONNECT
6	NC	NOT CONNECTED
7	RESERVED	DO NOT CONNECT
8	RESERVED	DO NOT CONNECT
9	COS+	ENCODER COS NON-INVERTED
10	SIN+	ENCODER SIN NON-INVERTED
11	INDEX-	ENCODER INDEX INVERTED
12	0V	ENCODER POWER SUPPLY RETURN
13	RESERVED	DO NOT CONNECT
14	NC	NOT CONNECTED
15	NC	NOT CONNECTED
CASING	SHIELD	-

J6: SENSOR CONNECTOR

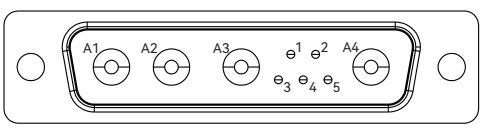


DA-15 MALE
CONTACT FINISH: GOLD
SHELL FINISH: NICKEL
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- NORCOMP 171-015-202 OR
- NORCOMP 171-015-203 OR
- 3M 8315-7000

PIN	SIGNAL	REMARKS
1	RESERVED	DO NOT CONNECT
2	RESERVED	DO NOT CONNECT
3	RESERVED	DO NOT CONNECT
4	RESERVED	DO NOT CONNECT
5	RESERVED	DO NOT CONNECT
6	EXTLIMIT_SUP	LIMIT POWER SUPPLY
7	EXTLIMIT_RTN	LIMIT POWER RETURN
8	NC	NOT CONNECTED
9	NC	NOT CONNECTED
10	RLS-	REVERSE LIMIT SWITCH DARK-ON
11	RLS+	REVERSE LIMIT SWITCH LIGHT-ON
12	NC	NOT CONNECTED
13	NC	NOT CONNECTED
14	FLS+	FORWARD LIMIT SWITCH LIGHT-ON
15	FLS-	FORWARD LIMIT SWITCH DARK-ON
CASING	SHIELD	-

J7: MOTOR CONNECTOR



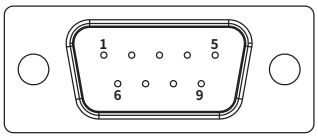
9W4 MALE
CONTACT FINISH: GOLD
SHELL FINISH: NICKEL
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- NORCOMP 681M9W4203L001

PIN	SIGNAL	REMARKS
A1	M1	MOTOR PHASE 1
A2	M2	MOTOR PHASE 2
A3	M3	MOTOR PHASE 3
A4	PE	PROTECTIVE EARTH
1	T1	PT100 IN 2-WIRE CONNECTION
2	T2	
3	RESERVED	DO NOT CONNECT
4	NC	NOT CONNECTED
5	NC	NOT CONNECTED
CASING	SHIELD	-

Shielded Cable Variants Connectors (AAL270-X-XX-XX-X-B-X)

J5: SENSOR CONNECTOR

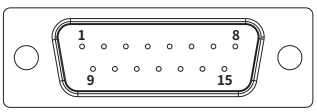


DE-9 MALE
CONTACT FINISH: GOLD
SHELL FINISH: NICKEL
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- NORCOMP 171-009-202 OR
- NORCOMP 171-009-203 OR
- WURTH 61800924923

PIN	SIGNAL	REMARKS
1	HA	HALL SIGNAL A
2	HB	HALL SIGNAL B
3	HC	HALL SIGNAL C
4	+5VDC	HALL POWER SUPPLY
5	0VDC	HALL POWER RETURN
6	FLS	FORWARD LIMIT SWITCH DARK-ON
7	EXTLIMIT_SUP	LIMIT POWER SUPPLY
8	EXTLIMIT_RTN	LIMIT POWER RETURN
9	RLS	RESERVE LIMIT SWITCH DARK-ON
CASING	SHIELD	-

J6: ENCODER CONNECTOR



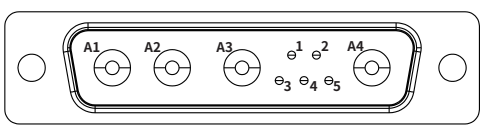
DA-15 MALE
CONTACT FINISH: GOLD
SHELL FINISH: NICKEL
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- NORCOMP 171-015-202 OR
- NORCOMP 171-015-203 OR
- WURTH 61801524923

Encoder Option	Signal Output	Signal Period (µm)
AAL270-x-xxx-ACA-x-x-x	SINCOS 1Vpp	20
AAL270-x-xxx-R4A-x-x-x	SINCOS 1Vpp	20
AAL270-x-xxx-H2A-x-x-x	SINCOS 1Vpp	4

PIN	SIGNAL	REMARKS
1	COS-	ENCODER COS INVERTED
2	SIN-	ENCODER SIN INVERTED
3	INDEX+	ENCODER INDEX NON-INVERTED
4	+5V	ENCODER POWER SUPPLY
5	NC	NOT CONNECTED
6	NC	NOT CONNECTED
7	P/H SENSOR	PQ signal for AAL270-x-xxx-R4A-x-x-x HL signal for AAL270-x-xxx-H2A-x-x-x
8	Q/L SENSOR	
9	COS+	ENCODER COS NON-INVERTED
10	SIN+	ENCODER SIN NON-INVERTED
11	INDEX-	ENCODER INDEX INVERTED
12	0V	ENCODER POWER RETURN
13	NC	NOT CONNECTED
14	NC	NOT CONNECTED
15	NC	NOT CONNECTED
CASING	SHIELD	-

J7: MOTOR CONNECTOR



9W4 MALE
CONTACT FINISH: GOLD
SHELL FINISH: TIN
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- NORCOMP 681M9W4203L001
- HARTING 09693017094

PIN	SIGNAL	REMARKS
A1	M1	MOTOR PHASE 1
A2	M2	MOTOR PHASE 2
A3	M3	MOTOR PHASE 3
A4	PE	PROTECTIVE EARTH
1	T1	PT100 IN 2-WIRE CONNECTION
2	T2	
3	RESERVED	DO NOT CONNECT
4	NC	NOT CONNECTED
5	NC	NOT CONNECTED
CASING	SHIELD	-

STACKED STAGES

STACKED STAGES

TGS-XY SERIES

- Tri Guide Stacked XY Stage
- Three rail guides support longer upper axis in the bottom
- Compact size with customized flat cables with built-in tubes

TGS-XY

Motor Specifications	Unit	L	U
Motor	-	AUM5-S3	AUM4-S3
Continuous Force (NC) @100°C ❶	N	295	166
Peak Force	N	2122	936
Force Constant ±10%	N/Arms	117.9	72.0
Back EMF Constant ±10%	Vpeak/(m/s)	96.3	58.8
Resistance (L-L) @25°C ±10% ❷	Ω	12.40	13.97
Inductance (L-L) ±40% ❸	mH	19.50	11.50
Continuous Current (NC) @100°C ❶	Arms	2.5	2.3
Peak Current	Arms	18.0	13.0
Max. Bus Voltage	Vdc	330	330
Magnetic Period	mm	84	60
Mechanical Specifications	**Unit**	**L**	**U**
Effective Stroke	mm	500	500
Resolution	μm	0.5/0.1/SINCOS	0.5/0.1/SINCOS
Repeatability	μm	±2/±1	±2/±1
Straightness	μm	±10	±10
Flatness	μm	±10	±10
Rated Payload	kg	NA	20
No-load Moving Mass	kg	40	7
No-load Total Mass	kg	370	370
Max. Static Moment	Nm	NA	10

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC=Air Cooling, WC=Water Cooling.
❷ Resistance is measured by DC current with standard 0.5m cable.
❸ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different.
The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
● The table above presents the highest capability of this stage layout.
● Contact us for more options and details.
● Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.
The contents of datasheet are subject to change without prior notice.

Ordering Part Number (OPN)

TGS-S0202-U76U46AD01-A1

Model:
TGS: TGS-XY base guide on granite

Cover Type:
S: Standard (Clear Anodized)
T: Standard (Black Anodized)
N: No Cover

Lower Axis Stroke: ❶
02: 200mm
03: 300mm
04: 400mm
05: 500mm

Upper Axis Stroke: ❶
02: 200mm
03: 300mm
04: 400mm
05: 500mm

Lower Axis Motor:
U76: AUM5-S-S3-J (Peak Force: 2122.0N)
U77: AUM5-S-S3-K (Peak Force: 2122.0N)
U78: AUM5-P-S3-J (Peak Force: 2122.0N)
U79: AUM5-P-S3-K (Peak Force: 2122.0N)

Upper Axis Motor:
U46: AUM4-S-S3-J (Peak Force: 936.0N)
U47: AUM4-S-S3-K (Peak Force: 936.0N)
U48: AUM4-P-S3-J (Peak Force: 936.0N)
U49: AUM4-P-S3-K (Peak Force: 936.0N)

Encoder Type:
AD0: ABA-20, BISS C (50nm)
A70: ABA-50, BISS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABA: ABI-51X, SINCOS (1Vpp)
ABF: ABI-51X, TTL (0.5μm)
ABH: ABI-51X, TTL (0.1μm)
R2F: Quantic, TTL (0.5μm)
R2H: Quantic, TTL (0.1μm)

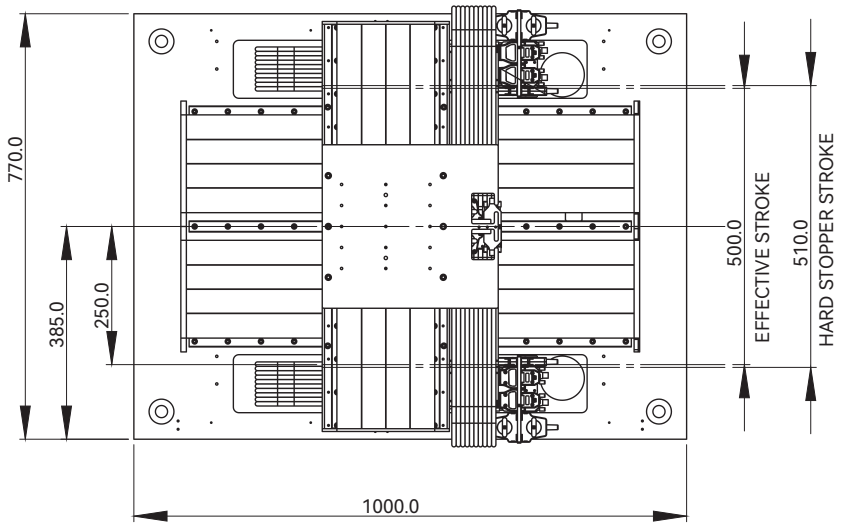
Scale Type:
1: Steel Tape, 11ppm/K

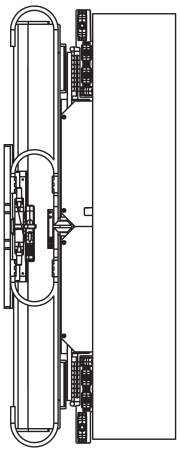
Cable Length:
A: 0.5m
B: 3.0m

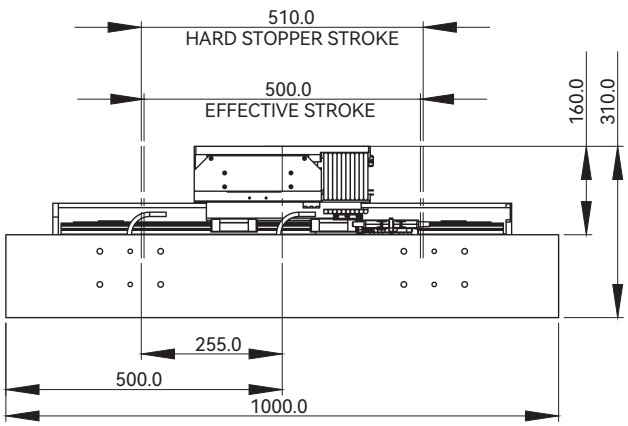
Termination:
1: Motor: Flying Leads/
Encoder: DSUB 15/Hall: DSUB 9
2: Motor: DSUB 9W4/
Encoder: DSUB 15/Hall: DSUB 9

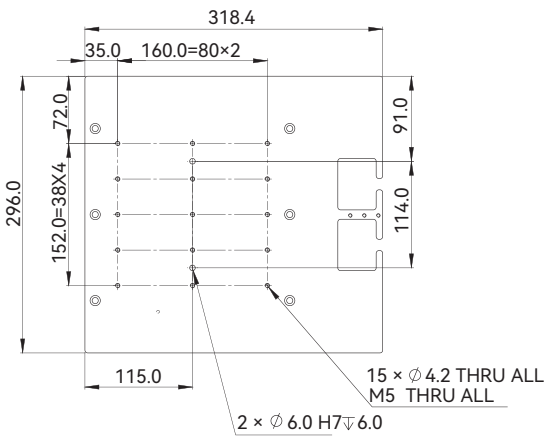
Note:
❶ Standard stroke in intervals of 100mm only. For more options, please contact Akribis sales engineers (cust-service@akribis-sys.com) .
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

Dimensional Drawing



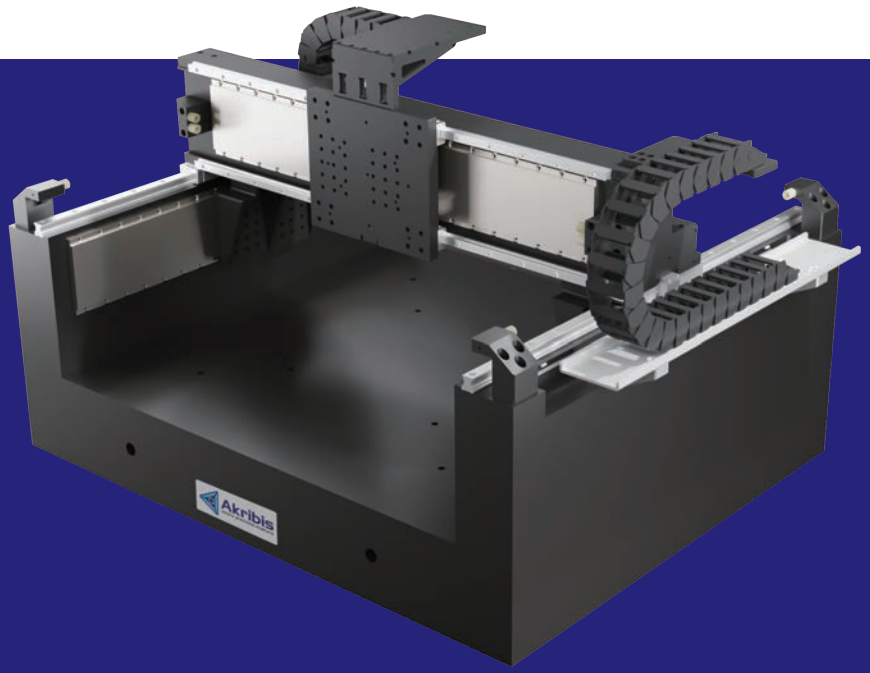






GANTRY STAGES

GANTRY STAGES



VRG-I SERIES

- Direct drive, zero backlash linear motor
- Two configurations H (dual motor dual encoder), T (single motor single encoder)
- High peak and fast continuous thrust response time
- High efficiency settling time

EN-25.5.1

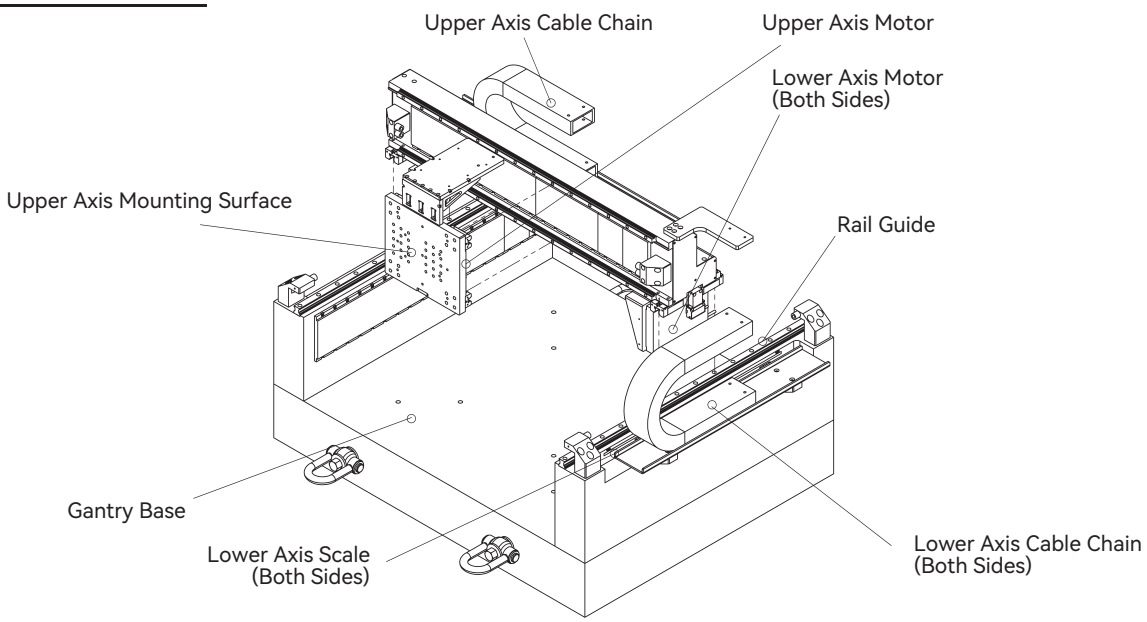
VRG-I

Motor Specifications		Unit	VRG1-H-L300N-U300N	VRG1-H-L400N-U400N	VRG1-H-L500N-U500N	VRG1-H-L600N-U600N
Motor Model	Lower	-	AJM100-B4×2			
	Upper	-	AJM100-B4			
Continuous Force (NC) @100°C ❶	Lower	N	893.6			
	Upper	N	446.8			
Peak Force	Lower	N	1409.1×2			
	Upper	N	1409.1			
Force Constant ±10%		N/Arms	97.1			
Back EMF Constant ±10%		Vpeak/(m/s)	79.3			
Resistance (L-L) @25°C ±10% ❷		Ω	5.2			
Inductance (L-L) ±30% ❸		mH	23.6			
Continuous Current (NC) @100°C ❶		Arms	4.6			
Peak Current		Arms	18.0			
Max. Bus Voltage		Vdc	600			
Magnetic Period		mm	20			
Mechanical Specifications		**Unit**	**VRG1-H-L300N-U300N**	**VRG1-H-L400N-U400N**	**VRG1-H-L500N-U500N**	**VRG1-H-L600N-U600N**
Effective Stroke		mm	300×300	400×400	500×500	600×600
Maximum Linear Acceleration		m/s^2	3			
Maximum Travel Speed		m/s	2			
Encoder Resolution		μm	0.1/0.5/SINCOS			
Repeatability		μm	±3			
Orthogonality		arcsec	10			
Nominal System Weight (Base not included)		kg	103	116	131	148
No-load Moving Mass	Lower	kg	41.0	45.0	48.0	52.0
	Upper	kg	7.0			
Material		-	Aluminum, Granite Optional			
Finish		-	Black Anodized			

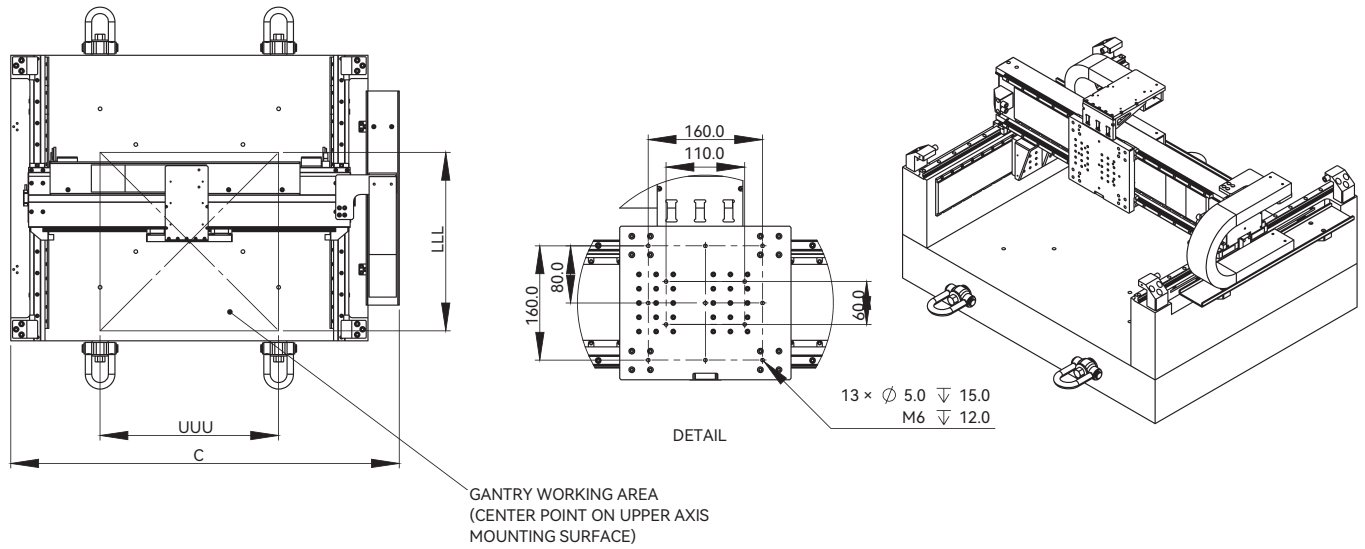
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

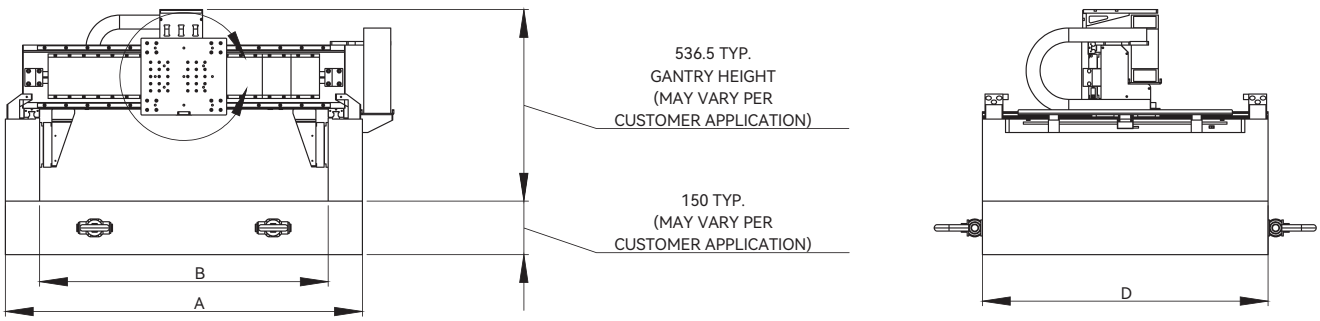
- Values of velocity , acceleration and no-load moving mass may vary based on customer applications and requirements.
- All specifications listed in the table are based on H-gantry design (dual motor, dual encoder). Other configurations T-gantry (single motor, single encoder) will havelimited performance parameters.
- Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

Exploded View



Dimensional Drawing





"LLL" LOWER-AXIS NOMINAL TRAVEL (mm)	"UUU" UPPER-AXIS NOMINAL TRAVEL (mm)	"A" GANTRY WIDTH (mm)	"B" UPPER-AXIS GANTRY SPACING (mm)	"C" SYSTEM WIDTH (mm)	"D" SYSTEM DEPTH (mm)
300	300	800	608	888	600
400	400	900	708	988	700
500	500	1000	808	1088	800
600	600	1100	908	1188	900

Note:

- Other nominal travel lengths and different nominal travel combinations are available.
- "A", "B", "C", "D" dimensions are shown for reference only and may vary per customer application.
- Electrical and mechanical limits included in gantry system.
- Dimensions in millimeters.

Ordering Part Number (OPN)

VRG1-H0202-J01J01AD01-A1

Model:
VRG1

Gantry Config: ❶
H: H-Gantry
T: T-Gantry

Lower Axis Stroke: ❷
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm

Upper Axis Stroke: ❷
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm

Lower Axis Motor:
J01: AJM30-B2-J (Peak Force: 214.7N)
J02: AJM30-B2-K (Peak Force: 214.7N)
J03: AJM30-B4-J (Peak Force: 429.4N)
J04: AJM30-B4-K (Peak Force: 429.4N)
J15: AJM50-B2-J (Peak Force: 369.0N)
J16: AJM50-B2-K (Peak Force: 369.0N)
J17: AJM50-B4-J (Peak Force: 738.1N)
J18: AJM50-B4-K (Peak Force: 738.1N)
J30: AJM80-B2-J (Peak Force: 550.2N)
J31: AJM80-B2-K (Peak Force: 550.2N)
J32: AJM80-B4-J (Peak Force: 1100.4N)
J33: AJM80-B4-K (Peak Force: 1100.4N)
J45: AJM100-B2-J (Peak Force: 704.5N)
J46: AJM100-B2-K (Peak Force: 704.5N)
J47: AJM100-B4-J (Peak Force: 1409.1N)
J48: AJM100-B4-K (Peak Force: 1409.1N)

Upper Axis Motor:
J01: AJM30-B2-J (Peak Force: 214.7N)
J02: AJM30-B2-K (Peak Force: 214.7N)
J03: AJM30-B4-J (Peak Force: 429.4N)
J04: AJM30-B4-K (Peak Force: 429.4N)
J15: AJM50-B2-J (Peak Force: 369.0N)
J16: AJM50-B2-K (Peak Force: 369.0N)
J17: AJM50-B4-J (Peak Force: 738.1N)
J18: AJM50-B4-K (Peak Force: 738.1N)
J30: AJM80-B2-J (Peak Force: 550.2N)
J31: AJM80-B2-K (Peak Force: 550.2N)
J32: AJM80-B4-J (Peak Force: 1100.4N)
J33: AJM80-B4-K (Peak Force: 1100.4N)
J45: AJM100-B2-J (Peak Force: 704.5N)
J46: AJM100-B2-K (Peak Force: 704.5N)
J47: AJM100-B4-J (Peak Force: 1409.1N)
J48: AJM100-B4-K (Peak Force: 1409.1N)

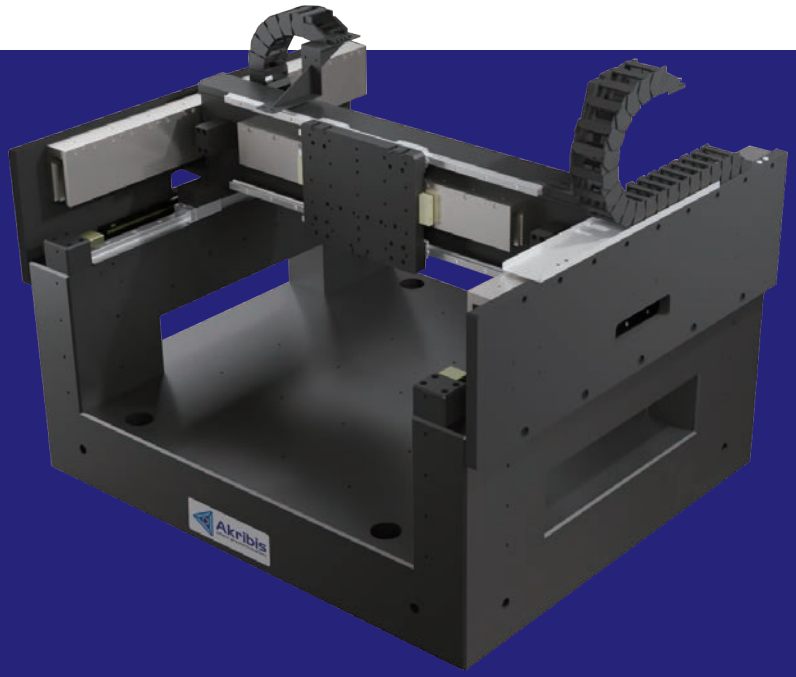
Termination:
1: Motor: Flying Leads/
Encoder: DSUB 15/Hall: DSUB 9
2：Motor: DSUB 9W4/
Encoder: DSUB 15/Hall: DSUB 9

Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABA: ABI-51X, SINCOS (1Vpp)
ABF: ABI-51X, TTL (0.5μm)
ABH: ABI-51X, TTL (0.1μm)
R2F: Quantic, TTL (0.5μm)
R2H: Quantic, TTL (0.1μm)

Note:
❶ All Gantries are Black Anodized. H= Dual motor dual encoder, T= Single motor single encoder.
❷ Standard stroke in intervals of 100mm only, for more options, customization is required.
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.



VRG-II SERIES

- A versatile gantry stage motor force in line with the bridge's COG
- Use ironless AUM motor
- Low velocity ripple

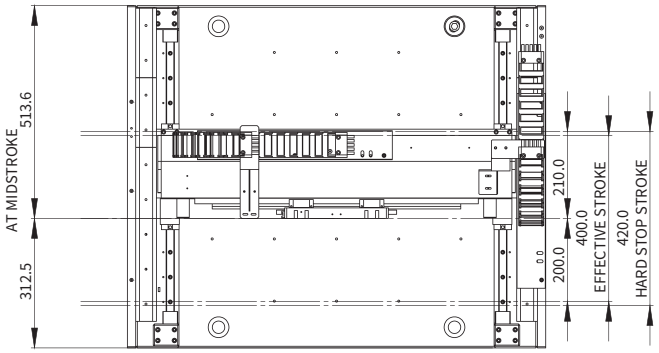
VRG-II

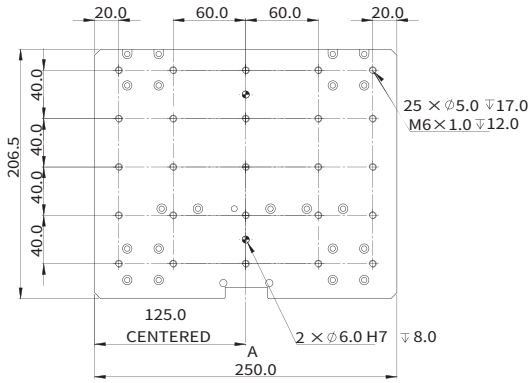
Motor Specifications	Unit	L	U
Motor Model	-	AUM5-S4×2	AUM5-S2
Continuous Force (NC) @100℃ ❶	N	393×2	197
Peak Force	N	2830×2	1415
Force Constant ±10%	N/Arms	157.2	78.6
Back EMF Constant ±10%	Vpeak/(m/s)	128.4	64.2
Resistance (L-L) @25℃ ±10% ❷	Ω	16.52	8.28
Inductance (L-L) ±40% ❸	mH	26.00	13.00
Continuous Current (NC) @100℃ ❶	Arms	2.5	2.5
Peak Current	Arms	18.0	18.0
Max. Bus Voltage	Vdc	330	330
Magnetic Period	mm	84	84
Mechanical Specifications	**Unit**	**L**	**U**
Effective Stroke	mm	400	400
Rated Payload	kg	20	
No-load Moving Mass	kg	40	4
Max Acceleration	m/s^2	20	20
Max Velocity	m/s	2	2
Encoder Resolution	μm	0.05/0.5/SINCOS	0.05/0.5/SINCOS
Minimal Step Size	μm	0.5	0.5
Repeatability	μm	±1.5	±1.0
Accuracy	μm	±10.0	±10.0
Straightness	μm	±10.0	±10.0
Flatness	μm	±10.0	±10.0
Yaw	arcsec	±10.0	±10.0
Pitch	arcsec	±10.0	±10.0
Orthogonality	arcsec	10.0	
No-load Stage Weight	kg	570	

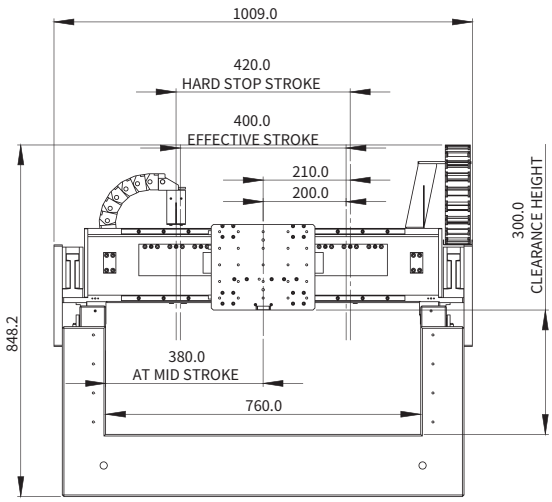
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

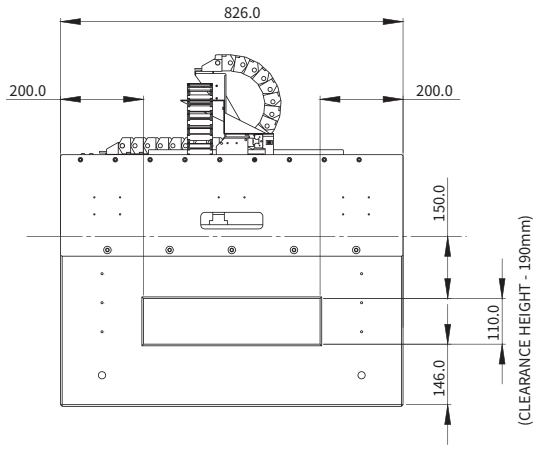
- The table above presents the highest capability of this stage layout.
- Contact us for more options and details.
- Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

Dimensional Drawing









Ordering Part Number (OPN)

VRG2-H0202-U46U17AD01-A2

Model:
VRG2

Gantry Config: ❶
H: H-Gantry
T: T-Gantry

Lower Axis Stroke: ❷
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm

Upper Axis Stroke: ❷
02: 200mm
03: 300mm
04: 400mm
05: 500mm
06: 600mm
07: 700mm
08: 800mm

Lower Axis Motor:
U46: AUM4-S-S3-J (Peak Force: 936.0N)
U47: AUM4-S-S3-K (Peak Force: 936.0N)
U48: AUM4-P-S3-J (Peak Force: 936.0N)
U49: AUM4-P-S3-K (Peak Force: 936.0N)
U50: AUM4-S-S4-J (Peak Force: 1248.0N)
U51: AUM4-S-S4-K (Peak Force: 1248.0N)
U52: AUM4-P-S4-J (Peak Force: 1248.0N)
U53: AUM4-P-S4-K (Peak Force: 1248.0N)
U76: AUM5-S-S3-J (Peak Force: 2122.0N)
U77: AUM5-S-S3-K (Peak Force: 2122.0N)
U78: AUM5-P-S3-J (Peak Force: 2122.0N)
U79: AUM5-P-S3-K (Peak Force: 2122.0N)
U80: AUM5-S-S4-J (Peak Force: 2830.0N)
U81: AUM5-S-S4-K (Peak Force: 2830.0N)
U82: AUM5-P-S4-J (Peak Force: 2830.0N)
U83: AUM5-P-S4-K (Peak Force: 2830.0N)

Termination:
2: Motor: DSUB 9W4/
Encoder: DSUB 15/Hall: DSUB 9
3: Motor: M23/
Encoder&Hall: M23

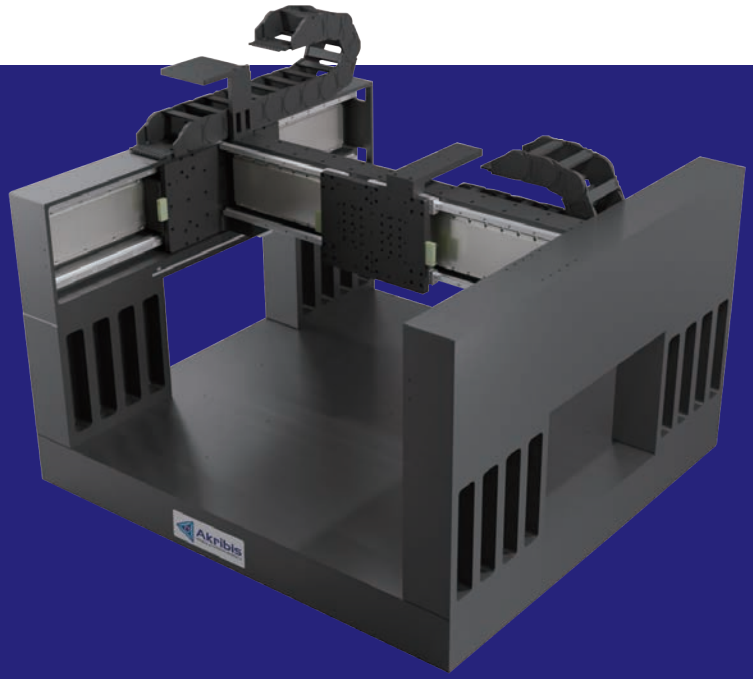
Cable Length:
A: 0.5m
B: 3.0m

Scale Type:
1: Steel Tape, 11ppm/K

Encoder Type:
AD0: ABA-20, BiSS C (50nm)
A71: ABA-50, Mitsubishi 2-Wires (50nm)
A73: ABA-50, EnDat 2.2 (50nm)
ABA: ABI-51X, SINCOS (1Vpp)
ABF: ABI-51X, TTL (0.5µm)
ABH: ABI-51X, TTL (0.1µm)
R2F: Quantic, TTL (0.5µm)
R2H: Quantic, TTL (0.1µm)

Upper Axis Motor:
U17: AUM3-S-S2-J (Peak Force: 289.0N)
U18: AUM3-S-S2-K (Peak Force: 289.0N)
U19: AUM3-P-S2-J (Peak Force: 289.0N)
U20: AUM3-P-S2-K (Peak Force: 289.0N)
U21: AUM3-S-S3-J (Peak Force: 433.0N)
U22: AUM3-S-S3-K (Peak Force: 433.0N)
U23: AUM3-P-S3-J (Peak Force: 433.0N)
U24: AUM3-P-S3-K (Peak Force: 433.0N)
U25: AUM3-S-S4-J (Peak Force: 578.0N)
U26: AUM3-S-S4-K (Peak Force: 578.0N)
U27: AUM3-P-S4-J (Peak Force: 578.0N)
U28: AUM3-P-S4-K (Peak Force: 578.0N)
U46: AUM4-S-S3-J (Peak Force: 936.0N)
U47: AUM4-S-S3-K (Peak Force: 936.0N)
U48: AUM4-P-S3-J (Peak Force: 936.0N)
U49: AUM4-P-S3-K (Peak Force: 936.0N)
U50: AUM4-S-S4-J (Peak Force: 1248.0N)
U51: AUM4-S-S4-K (Peak Force: 1248.0N)
U52: AUM4-P-S4-J (Peak Force: 1248.0N)
U53: AUM4-P-S4-K (Peak Force: 1248.0N)
U72: AUM5-S-S2-J (Peak Force: 1415.0N)
U73: AUM5-S-S2-K (Peak Force: 1415.0N)
U74: AUM5-P-S2-J (Peak Force: 1415.0N)
U75: AUM5-P-S2-K (Peak Force: 1415.0N)

Note:
❶ All Gantries are Black Anodized. H= Dual motor dual encoder, T= Single motor single encoder.
❷ Standard stroke in intervals of 100mm only, for more options, customization is required.
★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.



VRG-III SERIES

- A versatile gantry stage motor force in line with the bridge's COG
- Use ironcore AJM, AKM motor
- High force density

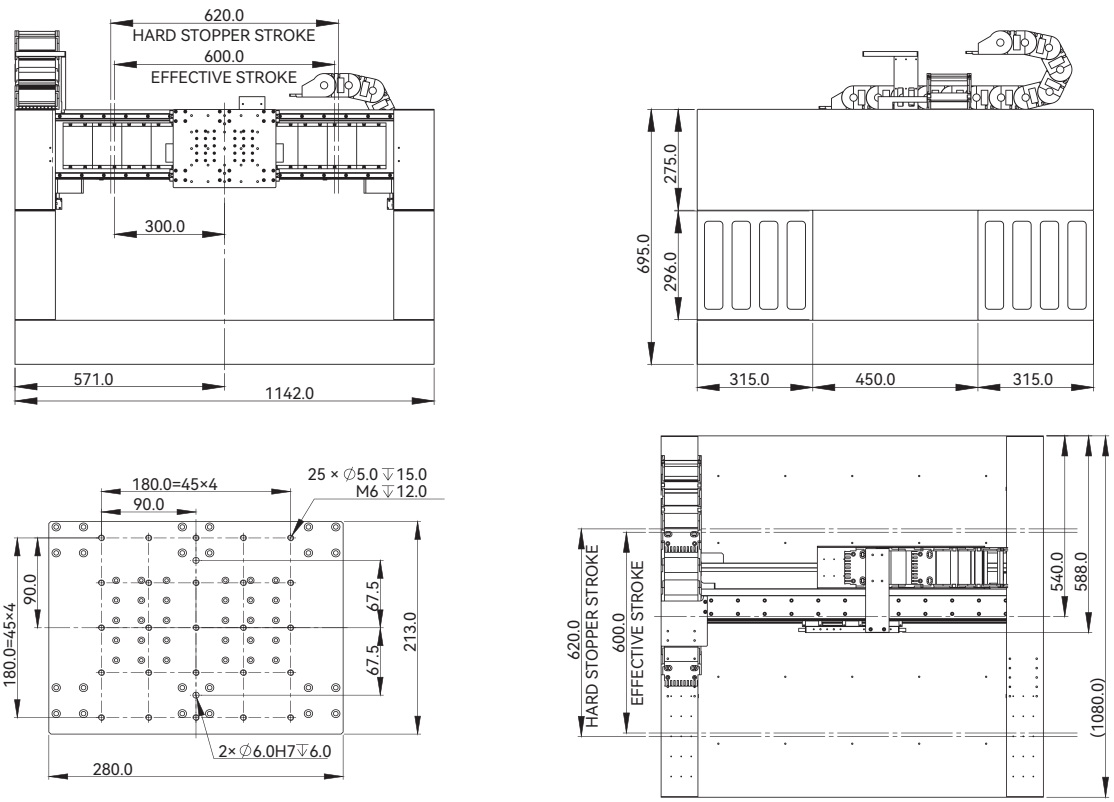
EN-25.5.1

VRG-III

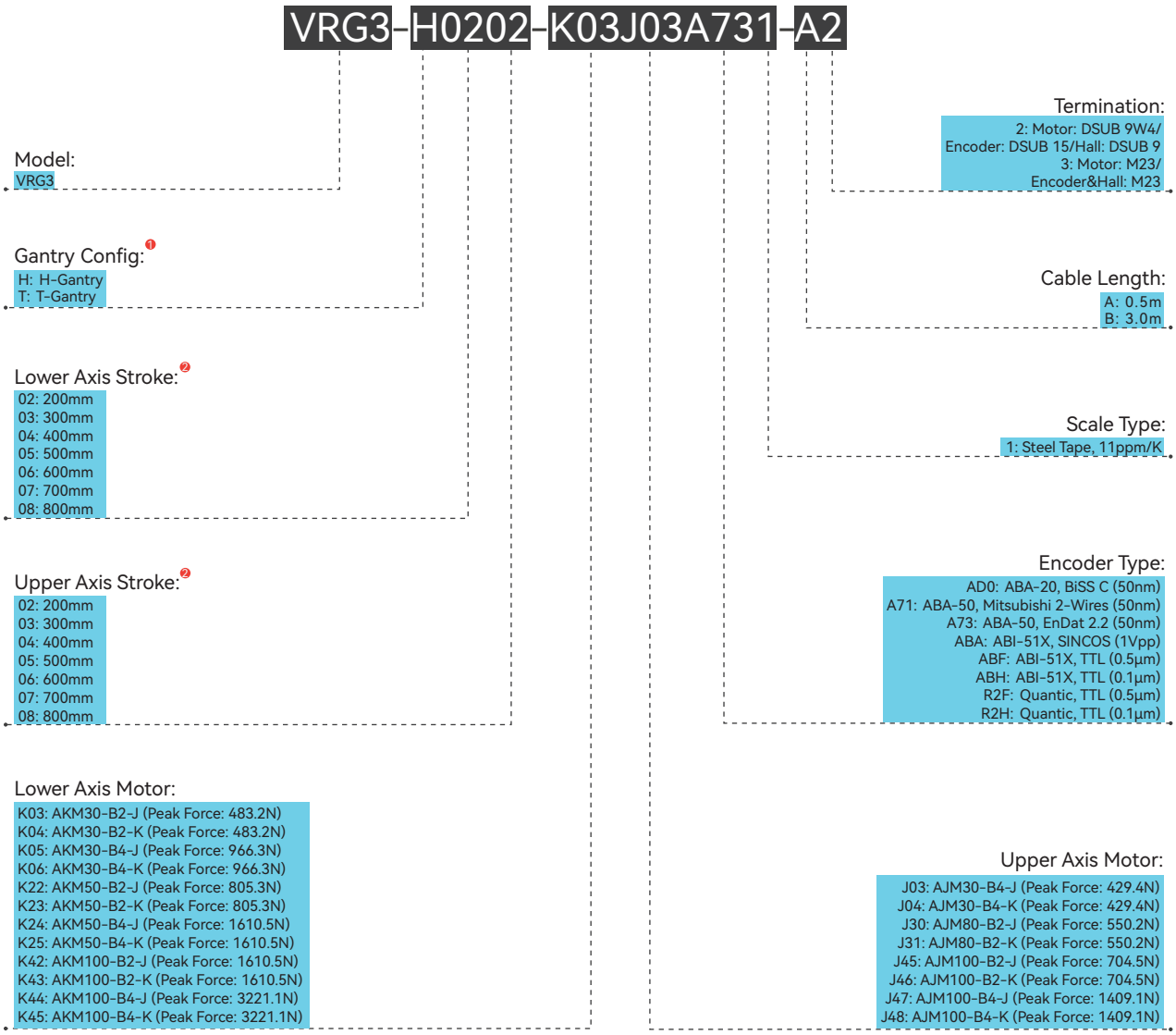
Motor Specifications	Unit	L	U
Motor Model	-	AKM100-B4×2	AJM100-B4
Continuous Force (NC) @100℃ ❶	N	1445.3×2	446.8
Peak Force	N	3221.1×2	1409.1
Force Constant ±10%	N/Arms	153.0	97.1
Back EMF Constant ±10%	Vpeak/(m/s)	124.9	79.3
Resistance (L-L) @25℃ ±10% ❷	Ω	2.3	5.2
Inductance (L-L) ±30% ❸	mH	58.0	23.6
Continuous Current (NC) @100℃ ❶	Arms	9.6	4.6
Peak Current	Arms	28.8	18.0
Max. Bus Voltage	Vdc	600	600
Magnetic Period	mm	42	20
Mechanical Specifications	**Unit**	**L**	**U**
Effective Stroke	mm	600	600
Resolution	μm	0.5/0.1/SINCOS	0.5/0.1/SINCOS
Repeatability	μm	±2/±1	±2/±1
Straightness	μm	±10	±10
Flatness	μm	±10	±10
Rated Payload	kg	NA	50
No-load Moving Mass	kg	53	6
No-load Total Mass	kg	685	685
Max. Static Moment Load	Nm	NA	20

❶ Measurement is taken at ambient temperature 25ºC. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5m lead wire.
❸ Inductance is measured by current frequency of 1 kHz.
● The table above presents the highest capability of this stage layout.
● Contact us for more options and details.
● Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.
The contents of datasheet are subject to change without prior notice.

Dimensional Drawing



Ordering Part Number (OPN)



Note:

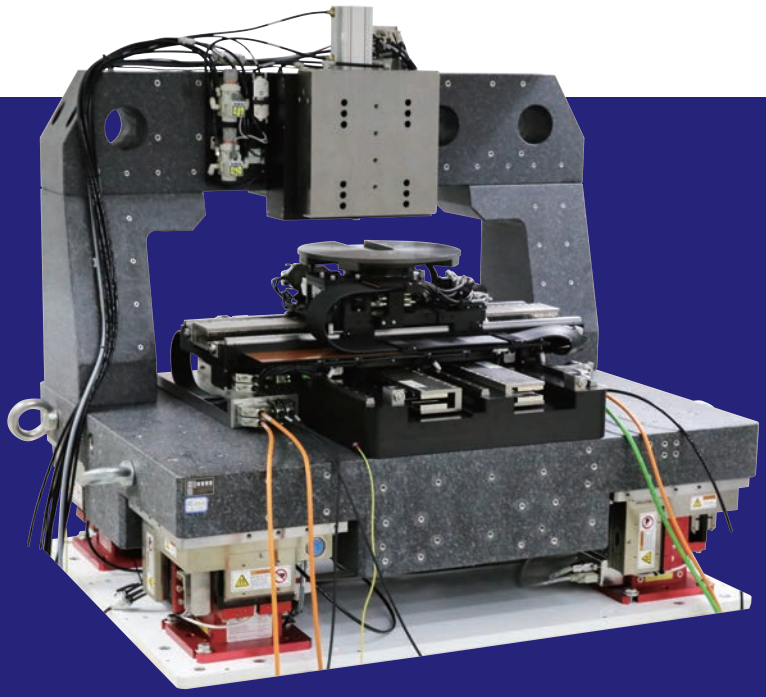
❶ All Gantries are Black Anodized. H= Dual motor dual encoder, T= Single motor single encoder.

❷ Standard stroke in intervals of 100mm only, for more options, customization is required.

★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

WAFER STAGES

WAFER STAGES



PGS-XYT SERIES

- XYT stack stage
- High accuracy, high stiffness, fast move and settle
- Good position stability
- Wafer stage
- Zero cogging
- Vacuum version available

EN-25.5.1

PGS-XYT

Motor Specifications	Upper Axis	Lower Axis	Theta Axis
Motor	AUM4-P5-S4-K-NH-3.0-NFB-V201	AUM4-P5-S6-K-NH-3.0-NFB-V201 ❹	ACW170-52-P-J7-H9D-3.0-FB-RT-11800-1000X-P5-Z17
Continuous Force (NC) @100°C ❶ Continuous Torque (NC) @100°C [T-axis] ❶	284 N	331 N	2.8 Nm
Peak Force Peak Torque [T-axis]	1605 N	1872 N	9.7 Nm
Force Constant ±10% Torque Constant ±10% [T-axis]	30.9 N/Arms	36 N/Arms	0.66 Nm/Arms
Back EMF Constant ±10%	25.2 Vpeak/(m/s)	29.4 Vpeak/(m/s)	0.056 Vpeak/rpm
Resistance @25°C ±10% ❷	1.22 Ω	1.75 Ω	2.76 Ω
Inductance ±20% ❸	0.96 mH	1.44 mH	1.65 mH
Continuous Current (NC) @100°C ❶	9.2 Arms	9.2 Arms	4.2 Arms
Peak Current	53 Arms	52 Arms	14.7 Arms
Max. Bus Voltage	330 Vdc	330 Vdc	330 Vdc
Magnetic Period	60 mm	60 mm	16 2P
Mechanical Specifications	**Upper Axis**	**Lower Axis**	**Theta Axis**
Effective Stroke ❺	360 mm	370 mm	360 mm Infinite
Bi-directional Repeatability ❻	±0.3 µm	±0.3 µm	±1 arcsec
Accuracy (with mapping)	±0.5 µm	±0.5 µm	±2 µm
Flatness	5 µm	5 µm	-
Straightness	7.5 µm	7.5 µm	-
Pitch	15 arcsec	10 arcsec	-
Pitch Repeatability	±0.5 arcsec	±0.5 arcsec	-
Yaw	10 arcsec	10 arcsec	-
Yaw Repeatability	±0.5 arcsec	±0.5 arcsec	-
Orthogonality	±5 arcsec	±5 arcsec	-
Radial Runout	-	-	±5 µm
Typical Position Stability ❼	±2 nm	±2 nm	±0.007 arcsec
Max. Acceleration	10 m/s²	10 m/s²	4000 deg/s²
Max. Velocity	1 m/s²	1 m/s²	600 deg/s²
Payload	2.5 kg	2.5 kg	2.5 kg

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC-Air Cooling, WC-Water Cooling.
❷ Resistance is measured by DC current with standard 0.5 m cable.
❸ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
❹ Two motor in parallel connection on bottom axis.
❺ Stroke up to 450 mm.
❻ ISO 230-2.
❼ 3 sigma, duration 2s, sampling rate 2kHz; T position stability up to +/-0.003 arcsec. For more information, please contact cust-service@akribis-sys.com.
★ Chuck excluded.
The contents of datasheet are subject to change without prior notice.

Standalone Z (on fix granite beam)

Typical Specifications	Z-axis
Effective Stroke	20 mm
Bi-directional Repeatability [1]	±0.6 μm
Accuracy (with mapping)	±1 μm
Flatness	2 μm
Straightness	2 μm
Pitch	10 arcsec
Pitch Repeatability	±0.5 arcsec
Yaw	10 arcsec
Yaw Repeatability	±0.5 arcsec
Typical Position Stability [2]	±10 nm
Payload	35 kg

[1] ISO 230-2.
[2] 3 sigma, duration 2s, sampling rate 2kHz.

Move and Settle

Typical Specifications	Value
Move & settle time in ±0.1um window: 80mm step	205 ms
Move & settle time in ±0.1um window: 25mm step	125 ms
Move & settle time in ±0.1um window: 5mm step	70 ms
Move & settle time in ±0.4 arcsec window: 180deg step	500 ms
Move & settle time in ±0.4 arcsec window: 1deg step	100 ms

★ Move and settle time is the average of all measured points.

Active Vibration Isolation

Specifications	Value
Passive Suspension Type	Air Diaphragm
Nominal Isolator Resonance	2 Hz
Active Type	Linear Motor
Control DOFs	6
Typical Load Capacity @ 4 bar with Servo Valve	1080 kg
Peak Force	560 N

Ordering Part Number (OPN)

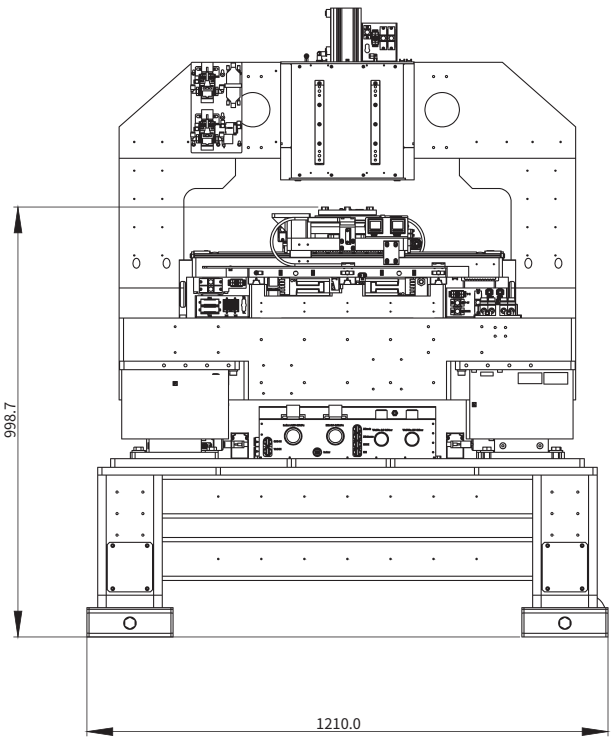
PGS-XYT-B3637-H2A3

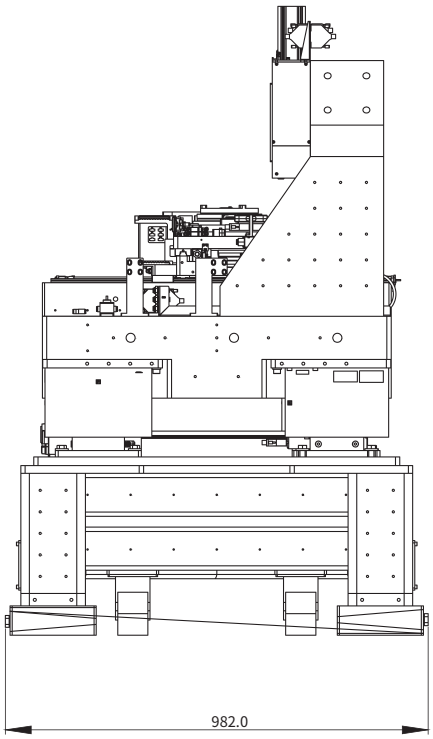
- Model: PGS-XYT
- Finish: B: Black Anodized
- Upper Axis Stroke: 36: 360mm
- Scale Type: 3: Glass G0 Robax, 0ppm/K
- Encoder Type: H2A: LIF4, SINCOS (1Vpp)
- Lower Axis Stroke: 37: 370mm

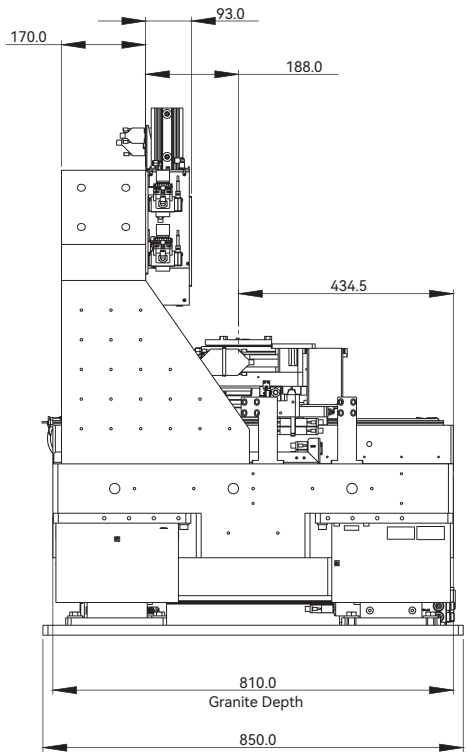
Note:
★ Products can be customized to suit specific working environments, please contact cust-service@akribis-sys.com.

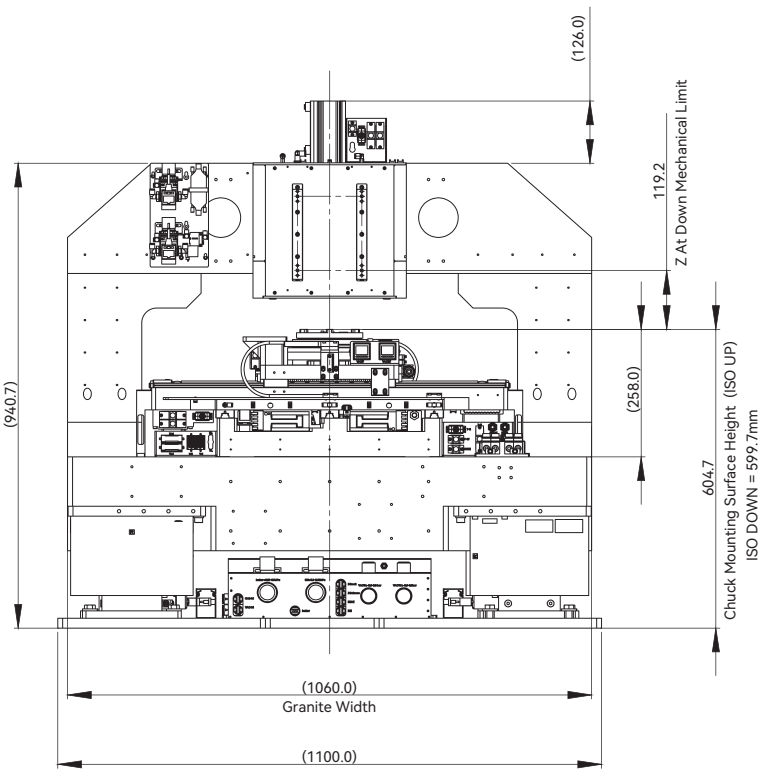
Dimensional Drawing

Overall Dimension



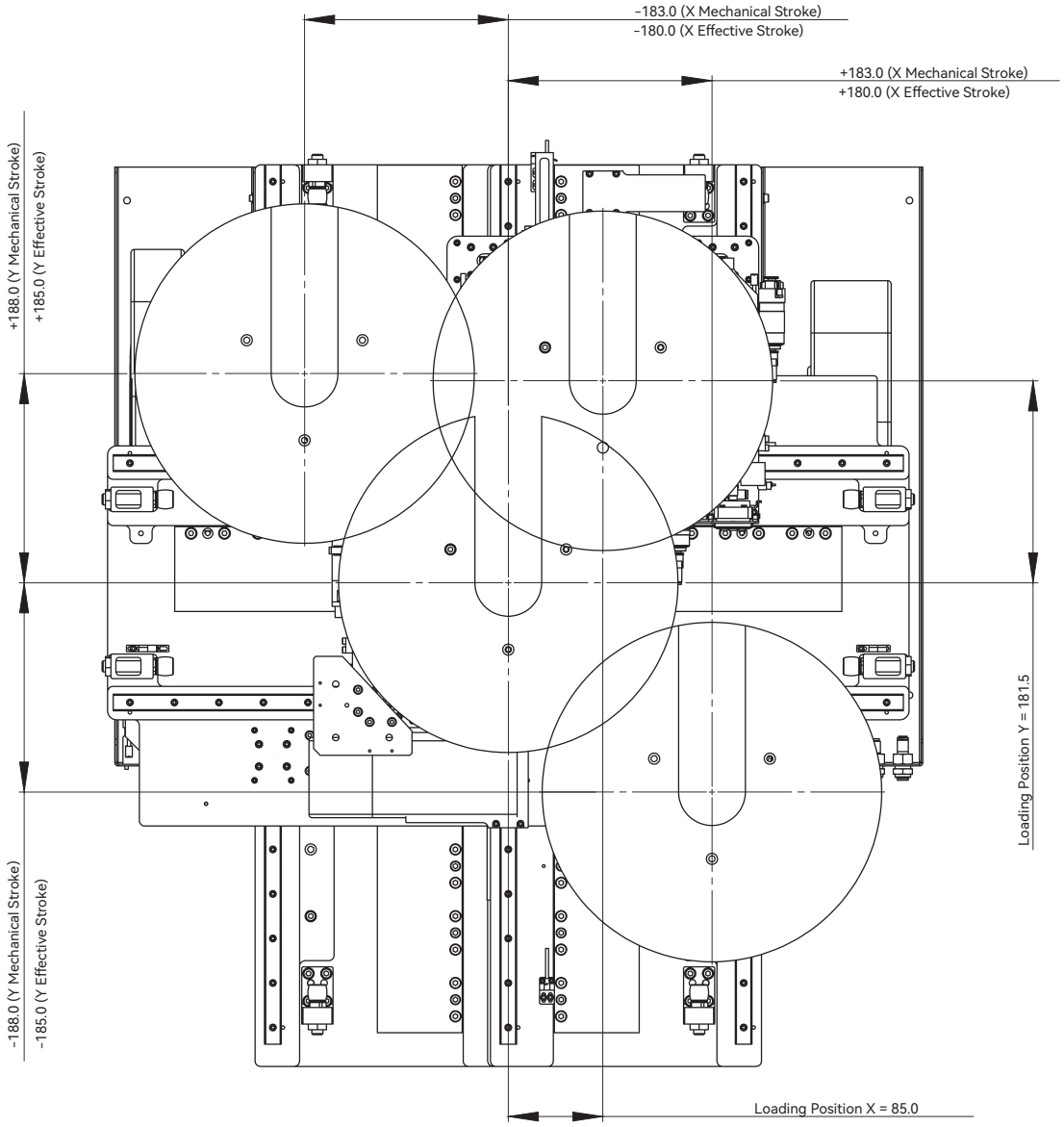






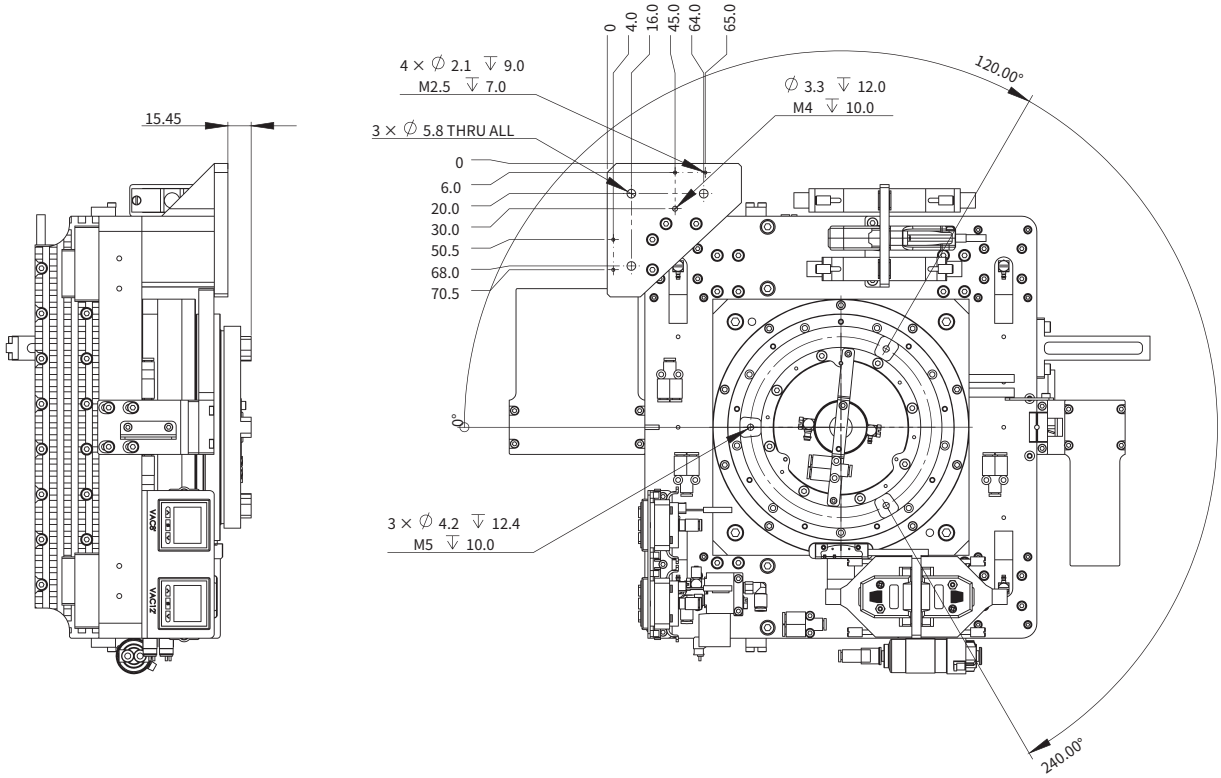
Dimensional Drawing

Stroke



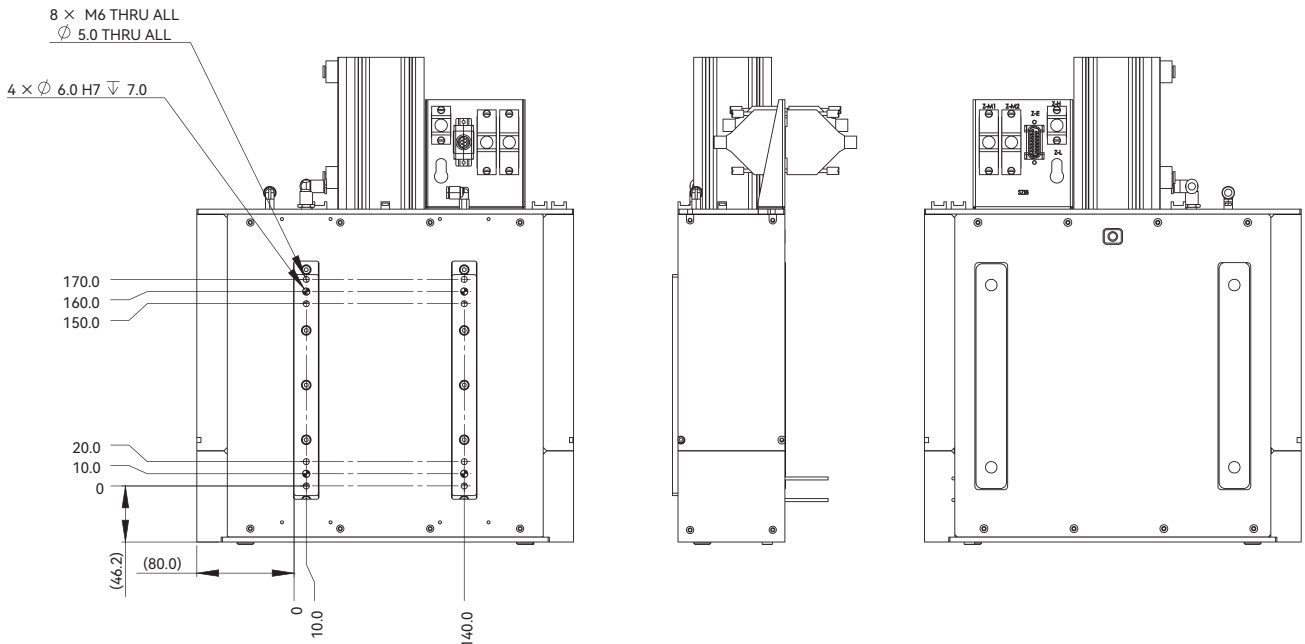
Interface Drawing

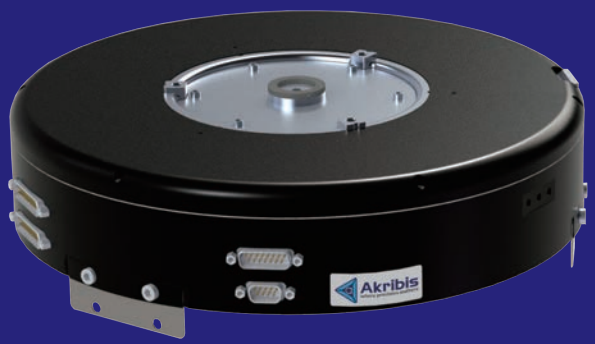
T-axis Mechanical Interface



Interface Drawing

Z-axis Mechanical Interface





PGS-ZTPR SERIES

- Frictionless guidance with wear-free flexure bearings
- Tight integration provides 4 degrees of freedom (Z, Rx, Ry, Rz) motion in a compact and lightweight package
- Optimized dynamics for rapid move and settle and nanometric position stability
- Vacuum feedthrough channel to chuck available
- Suitable for wafer autofocus, levelling, and alignment in a wide range of inspection and metrology applications

EN-25.5.1

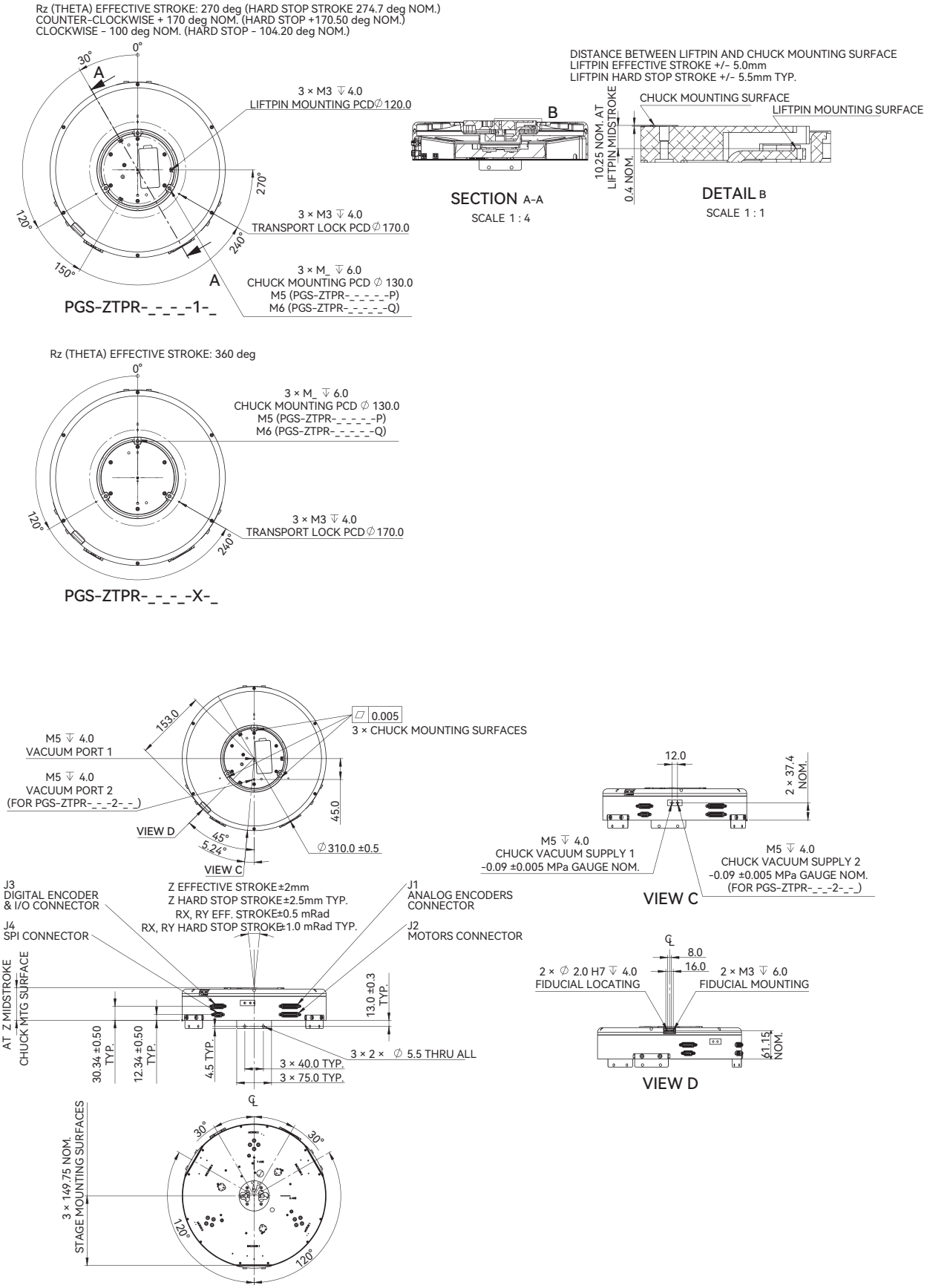
PGS-ZTPR

Motor Specifications	Payload Mass: 1.4-2.0 kg PGS-ZTPR-_-1-_-_-_ PGS-ZTPR-_-2-_-_-_	Payload Mass: 2.0-2.5 kg PGS-ZTPR-_-3-_-_-_ PGS-ZTPR-_-4-_-_-_
For Z, Rx and Ry axis		
Motor	AVMG40-5-0.5	AVM040-G-050-005-F-001
Continuous Force (NC) @100°C ❶❷	8.1 N	8.5 N
Peak Force ❷	20.0 N	20.9 N
Force Constant ±10% ❷	8.1 N/A	8.5 N/A
Back EMF Constant ±10% ❷	8.1 V/(m/s)	8.5 V/(m/s)
Resistance @25°C ±10% ❸	7.3 Ω	7.3 Ω
Inductance ±20% ❹	2.9 mH	2.9 mH
Continuous Current (NC) @100°C ❶	1.0 A	1.0 A
Peak Current	2.5 A	2.5 A
Max. Voltage	48 Vdc	48 Vdc
For Rz axis		
Motor	ACW130-P14-P-K-NH-0.1-NFB-Z25	
Continuous Torque (NC) @130°C ❶	2.4 Nm	
Peak Torque	8.3 Nm	
Torque Constant ±10%	0.55 Nm/Arms	
Back EMF Constant ±10%	0.047 Vpeak/rpm	
Resistance (L-L) @25°C ±10% ❸	2.20 Ω	
Inductance (L-L) ±20% ❹	1.4 mH	
Continuous Current (NC) @130°C ❶	4.3 Arms	
Peak Current	15 Arms	
Max. Bus Voltage	330 Vdc	
Pole Number, 2p	16	
For Lift Pin		
Motor	Permanent Magnet DC Stepper Motor	
Phase	2	
Step Angle	7.5°	
Rated Current	0.35 A	
Resistance @20°C ±10%	14 Ω	
Coil Type	Bi-Polar	

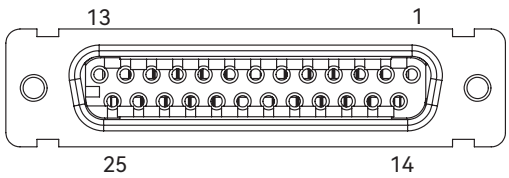
Mechanical Specifications	Z	Rx,Ry	Rz	Lift Pin
Effective Stroke	4 mm	±0.5 mrad	360° or 270° ❺	10 mm
Resolution	SINCOS	SINCOS	0.019 arcsec	-
Unidirectional Repeatability	±0.05 µm	-	-	±30 µm
Bidirectional Repeatability	±0.075 µm	-	±3 arcsec	-
Typical RMS Standstill Jitter (1σ), 1 kHz Cutoff	3.33 nm	0.01 arcsec	0.083 arcsec	-
Face Runout Repeatability (at R = 140mm)	-	-	±0.75 µm	-
Radial Runout Repeatability	-	-	±0.75 µm	-
Rated Payload	1.4 - 2.5 kg ❻			0.15 kg
Max. Acceleration (Depends on Payload)	2 m/s²	-	10000 deg/s²	-
Max. Velocity (Depends on Payload)	0.1 m/s	-	720 deg/s	-
Typical Move and Settle Time (With 1.5 kg Payload)	1 µm to ±50 nm in 20 ms 100 µm to ±50 nm in 50 ms 1 µm to ±30 nm in 50 ms 100 µm to ±30 nm in 90 ms	-	1° to ±0.4 arcsec in 100 ms 120° to ±0.4 arcsec in 400 ms 180° to ±0.4 arcsec in 1 s	10 mm in 2 s
Module Mass (Depends on Model)	6 - 8 kg			
Surface Finish	Black or clear anodized options			

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 3 m cable.
The contents of datasheet are subjected to change without prior notice.
❹ Inductance is measured by current frequency of 1 kHz.
❺ The Rz effective stroke for the module with lift pin option is 200°, hard stop stroke is typically 250°.
❻ Design needs to be customized to match payload mass, please contact cust-service@akribis-sys.com.

Dimensional Drawing



J1 ANALOG ENCODERS CONNECTOR

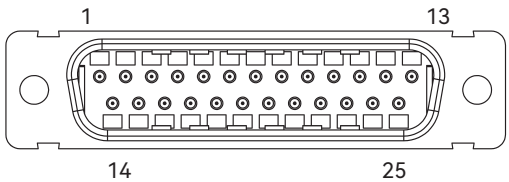


DB-25 FEMALE
CONTACT FINISH: GOLD
SHELL FINISH: TIN
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- 3M 8325-7000

J1 ANALOG ENCODERS CONNECTOR	PIN	SIGNAL	REMARKS
	1	Z1_+5V	Z1 ENCODER POWER SUPPLY
	2	Z1_SIN+	Z1ENCODER SIN NON-INVERTED
	3	Z1_COS+	Z1 ENCODER COS NON-INVERTED
	4	Z1_IND+	Z1ENCODER INDEX NON-INVERTED
	5	Z2_+5V	Z2 ENCODER POWER SUPPLY
	6	Z2_SIN+	Z2 ENCODER SIN NON-INVERTED
	7	Z2_COS+	Z2 ENCODER COS NON-INVERTED
	8	Z2_IND+	Z2 ENCODER INDEX NON-INVERTED
	9	Z3_+5V	Z3 ENCODER POWER SUPPLY
	10	Z3_SIN+	Z3 ENCODER SIN NON-INVERTED
	11	Z3_COS+	Z3 ENCODER COS NON-INVERTED
	12	Z3_IND+	Z3 ENCODER INDEX NON-INVERTED
	13	PE	PROTECTIVE EARTH
	14	Z1_0V	Z1 ENCODER POWER SUPPLY RETURN
	15	Z1_SIN-	Z1 ENCODER SIN INVERTED
	16	Z1_COS-	Z1 ENCODER COS INVERTED
	17	Z1_IND-	Z1 ENCODER INDEX INVERTED
	18	Z2_0V	Z2 ENCODER POWER SUPPLY RETURN
	19	Z2_SIN-	Z2 ENCODER SIN INVERTED
	20	Z2_COS-	Z2 ENCODER COS INVERTED
	21	Z2_IND-	Z2 ENCODER INDEX INVERTED
	22	Z3_0V	Z3 ENCODER POWER SUPPLY RETURN
	23	Z3_SIN-	Z3 ENCODER SIN INVERTED
	24	Z3_COS-	Z3 ENCODER COS INVERTED
	25	Z3_IND-	Z3 ENCODER INDEX INVERTED
	CASE	SHIELD	-

J2 MOTORS CONNECTOR

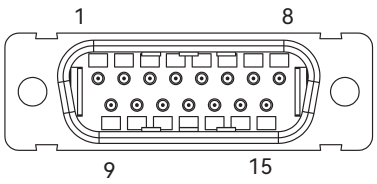


DB-25 MALE
CONTACT FINISH: GOLD
SHELL FINISH: TIN
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- 3M 8325-7000

J2 MOTORS CONNECTOR	PIN	SIGNAL	REMARKS
	1	PE	PROTECTIVE EARTH
	2	T_M3	THETA MOTOR PHASE 3
	3	T_M2	THETA MOTOR PHASE 2
	4	T_M1	THETA MOTOR PHASE 1
	5	PE	PROTECTIVE EARTH
	6	LP_STEP_B	LIFT PIN STEPPER MOTOR PHASE B
	7	LP_STEP_A	LIFT PIN STEPPER MOTOR PHASE A
	8	PE	PROTECTIVE EARTH
	9	Z3_M-	Z3 MOTOR TERMINAL 2
	10	PE	PROTECTIVE EARTH
	11	Z2_M-	Z2 MOTOR TERMINAL 2
	12	PE	PROTECTIVE EARTH
	13	Z1_M-	Z1 MOTOR TERMINAL 2
	14	PE	PROTECTIVE EARTH
	15	T_M3	THETA MOTOR PHASE 3
	16	T_M2	THETA MOTOR PHASE 2
	17	T_M1	THETA MOTOR PHASE 1
	18	LP_STEP_B'	LIFT PIN STEPPER MOTOR PHASE B'
	19	LP_STEP_A'	LIFT PIN STEPPER MOTOR PHASE A'
	20	PE	PROTECTIVE EARTH
	21	Z3_M+	Z3 MOTOR TERMINAL 1
	22	PE	PROTECTIVE EARTH
	23	Z2_M+	Z2 MOTOR TERMINAL 1
	24	PE	PROTECTIVE EARTH
	25	Z1_M+	Z1 MOTOR TERMINAL 1
	CASE	SHIELD	-

J3 DIGITAL ENCODER & I/O CONNECTOR

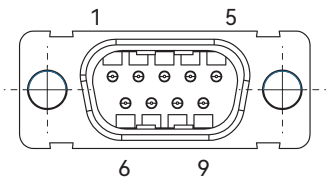


DA-15 MALE
CONTACT FINISH: GOLD
SHELL FINISH: TIN
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- 3M 8315-7000

J3 DIGITAL ENCODER & I/O CONNECTOR	PIN	SIGNAL	REMARKS
	1	CVAC_VALV_2	CHUCK VACUUM VALVE CONTROL SIGNAL PORT 2
	2	LP_LIM_SUPRET	LIFT PIN LIMIT SWITCH POWER SUPPLY RETURN
	3	CVAC_VALV_1	CHUCK VACUUM VALVE CONTROL SIGNAL PORT 1
	4	T_MA+	THETA ENCODER CLOCK NON-INVERTED
	5	T_SL+	THETA ENCODER SIGNAL NON-INVERTED
	6	T_+5V	THETA ENCODER POWER SUPPLY
	7	I/O_0V	I/O POWER SUPPLY RETURN
	8	I/O_+24V	I/O POWER SUPPLY
	9	LP_LIM_DARKON	LIFT PIN LIMIT SWITCH DARK-ON
	10	LP_LIM_SUP	LIFT PIN LIMIT SWTITCH POWER SUPPLY
	11	T_MA-	THETA ENCODER CLOCK INVERTED
	12	T_SL-	THETA ENCODER SIGNAL INVERTED
	13	T_0V	THETA ENCODER POWER SUPPLY RETURN
	14	I/O_0V	I/O POWER SUPPLY RETURN
	15	I/O_+24V	I/O POWER SUPPLY
	CASE	SHIELD	-

J4 SPI CONNECTOR



DE-9 MALE
CONTACT FINISH: GOLD
SHELL FINISH: TIN
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:
- 3M 8309-7000

J4 SPI CONNECTOR	PIN	SIGNAL	REMARKS
	1	PE	PROTECTIVE EARTH
	2	SPI_SS+	SPI SLAVE SELECT NON-INVERTED
	3	SPI_SCLK-	SPI CLOCK INVERTED
	4	SPI_MISO-	SPI MASTER IN/SLAVE OUT INVERTED
	5	SPI_MOSI+	SPI MASTER OUT/SLAVE IN NON-INVERTED
	6	SPI_SS-	SPI SLAVE SELECT INVERTED
	7	SPI_MISO+	SPI MASTER IN/SLAVE OUT NON-INVERTED
	8	SPI_SCLK+	SPI CLOCK NON-INVERTED
	9	SPI_MOSI-	SPI MASTER OUT/SLAVE IN INVERTED
	CASE	SHIELD	-

Ordering Part Number (OPN)

PGS-ZTPR-C-1-1-1-P

Model:
PGS-ZTPR

Finish:
C: Clear Anodized
B: Black Anodized

Payload Mass:
1: 1.4~1.7kg
2: 1.7~2.0kg
3: 2.0~2.3kg
4: 2.3~2.5kg

Chuck Interface Option:
P: M5 Tapped Holes
Q: M6 Tapped Holes

Lift Pin Module Option:
X: None
1: Indirect Drive Lift Pin 10mm Travel

Vacuum Supply to Chuck Interface:
1: Single Channel
2: Dual Channel

Note:
★ Products can be customized to meet specific working environments, please contact cust-service@akribis-sys.com.

Module/Stage Cable Length and Termination

Cable Length [1]	
-	Cable-free
A	0.5m
B	3.0m
C	5.0m
D	1.0m
E	0.8m
F	0.3m

Cable Length	Termination
A, B, C, D	1
A, B, C, D	2
A	3
E	4
-	5
F	6

Termination	Motor Cable Connector	Encoder Cable Connector	Hall Sensor Cable Connector	Remarks/Notes
1	Flying Leads	DSUB 15	DSUB 9	Thermal Sensor Wires Built-in with Motor Cable Connector or with Hall Sensor Cable Connector.
2	DSUB 9W4	DSUB 15	DSUB 9	Thermal Sensor Wires Built-in with Motor Cable Connector or with Hall Sensor Cable Connector.
3	M23	M23		Thermal Sensor Wires Built-in with Encoder Cable & Hall Sensor Cable Connector.
4	MATE-N-LOK	DSUB HD26	N/A	No Hall Sensor, compatible with APK-ME3 Driver.
5	DSUB 9W4	DSUB 15	DSUB 15	Thermal Sensor Wires Built-in with Motor Cable Connector or with Hall Sensor Cable Connector Limit Switch Cable with Hall Sensor Cable Connector.
6	TYCO 4	TYCO 15		For Ball-Screw Linear Module, along with TYCO2 Brake Interface.

Example: A1 module with 0.5m cable length, the motor cable is flying lead without a connector, the encoder cable comes along with a 15-pin DSUB connector the hall cable comes along with a 9-pin DSUB connector.

Note:
[1] Cable length means the the original length along with motor or encoder.

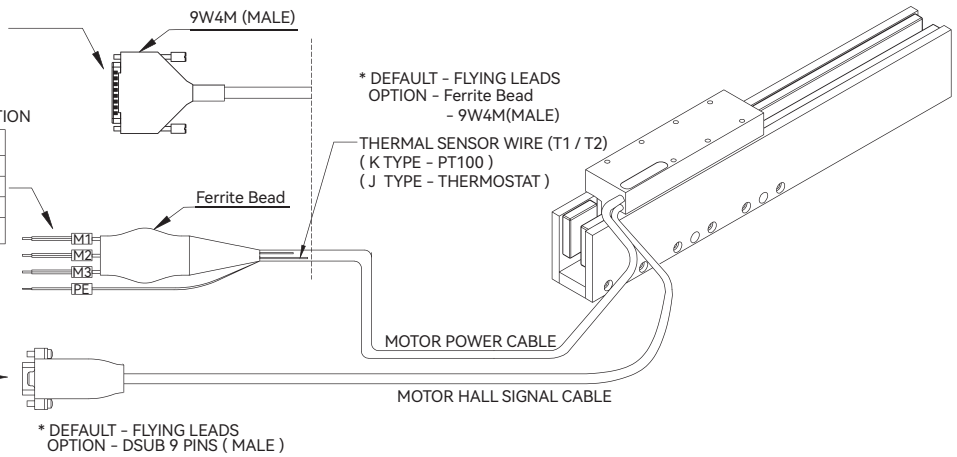
DGL150/ DGL180 / XRL
—— AUM2 / 3 Series Motor Cable Connection

MOTOR CABLE WITH 9W4M

PIN	DESCRIPTION	9W4M
A1	M1	YELLOW / GREY
A2	M2	BLUE/ORANGE
A3	M3	RED/GREEN
A4	PE	GREEN/YELLOW
1	T1	BROWN
2	T2	BROWN / BLACK
CASING	SHIELD	SHIELD

MOTOR CABLE WITH FLYING LEAD OR FERRITE BEAD OPTION

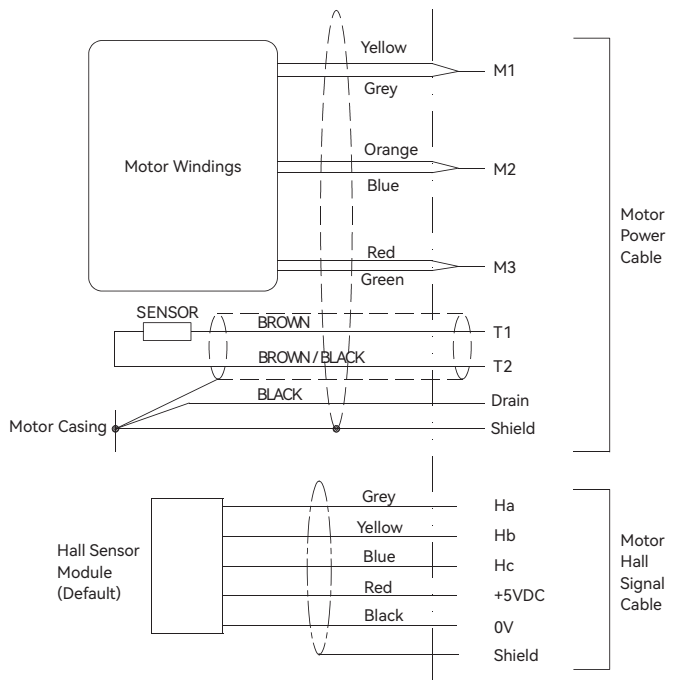
PIN	DESCRIPTION	FLYING LEADS	FERRITE BEAD
-	M1	YELLOW / GREY	BLACK
-	M2	BLUE/ORANGE	BLACK
-	M3	RED/GREEN	BLACK
-	PE	BLACK	YELLOW/GREEN



HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREY
2	HB	YELLOW
3	HC	BLUE
4	+5VDC	RED
5	0VDC	BLACK

Cable Connection Information



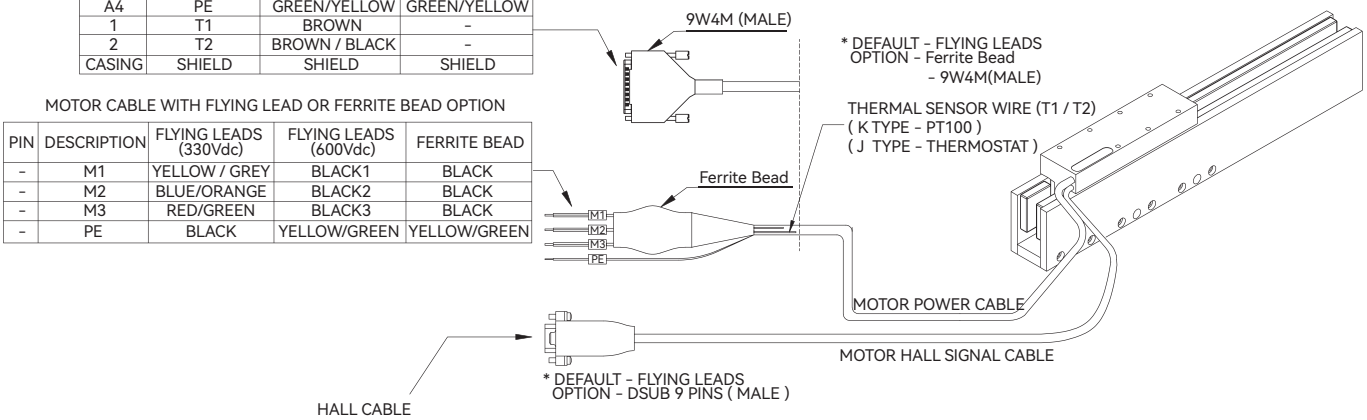
DGL200 / DGL260 / VRG-II / TGS-XY
—— AUM4 / 5 Series Motor Cable Connection

MOTOR CABLE WITH 9W4M

PIN	DESCRIPTION	9W4M (330Vdc)	9W4M (600Vdc)
A1	M1	YELLOW / GREY	BLACK1
A2	M2	BLUE/ORANGE	BLACK2
A3	M3	RED/GREEN	BLACK3
A4	PE	GREEN/YELLOW	GREEN/YELLOW
1	T1	BROWN	-
2	T2	BROWN / BLACK	-
CASING	SHIELD	SHIELD	SHIELD

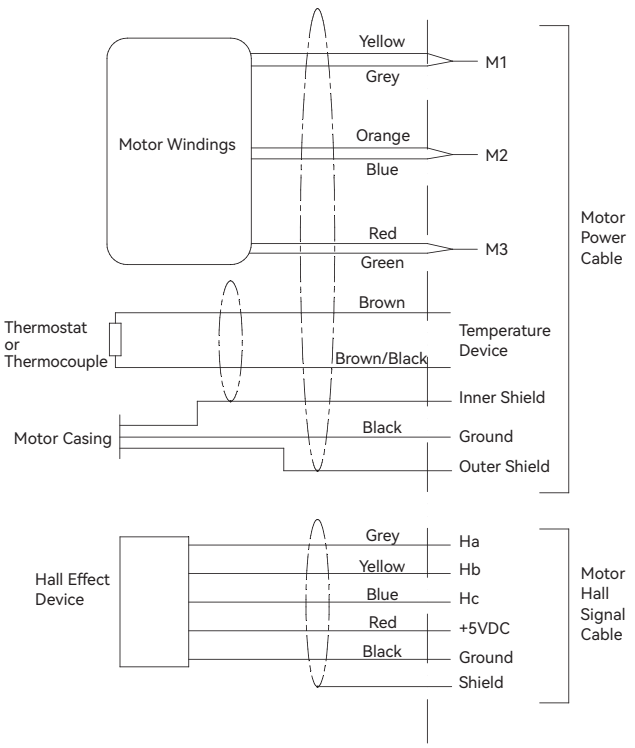
MOTOR CABLE WITH FLYING LEAD OR FERRITE BEAD OPTION

PIN	DESCRIPTION	FLYING LEADS (330Vdc)	FLYING LEADS (600Vdc)	FERRITE BEAD
-	M1	YELLOW / GREY	BLACK1	BLACK
-	M2	BLUE/ORANGE	BLACK2	BLACK
-	M3	RED/GREEN	BLACK3	BLACK
-	PE	BLACK	YELLOW/GREEN	YELLOW/GREEN

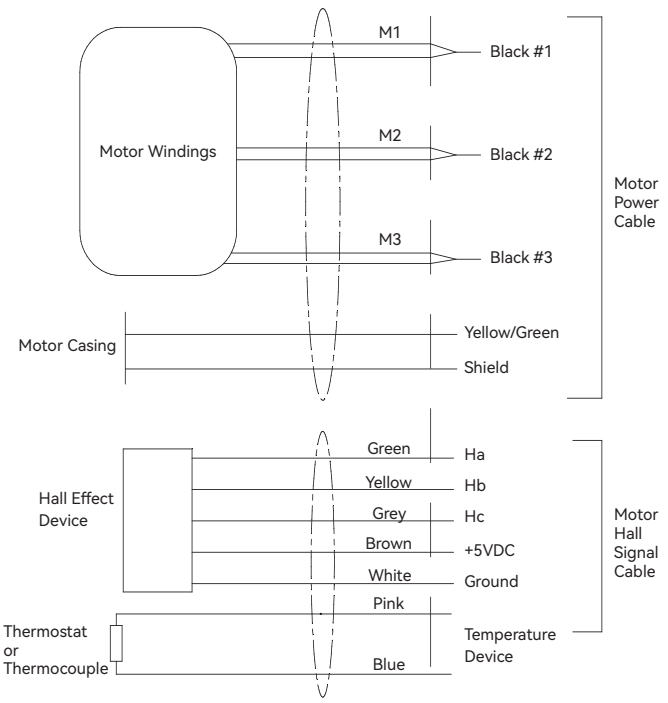


PIN	DESCRIPTION	FLYING LEAD (330Vdc)	FLYING LEAD (600Vdc)
1	HA	GREY	GREEN
2	HB	YELLOW	YELLOW
3	HC	BLUE	GREY
4	+5VDC	RED	BROWN
5	0VDC	BLACK	WHITE
8	T1	-	PINK
9	T2	-	BLUE

Cable Connection Information (330Vdc)



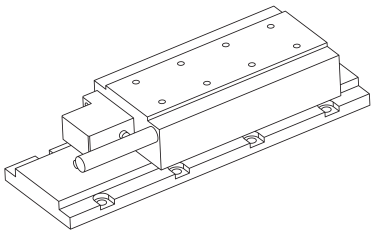
Cable Connection Information (600Vdc)

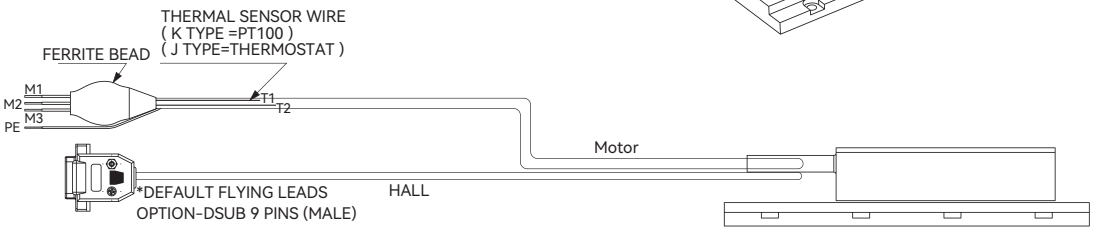


DGL / VRG-I / VRG-III
—— AJM Series Motor Cable Connection

MOTOR CABLE

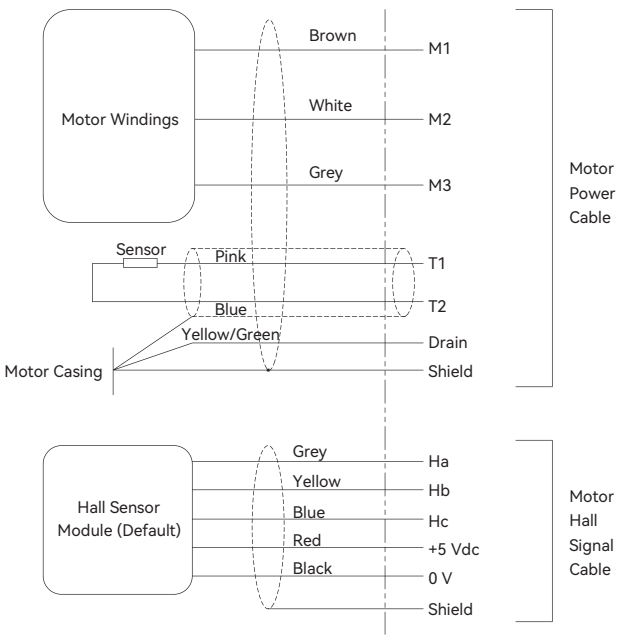
PIN	DESCRIPTION	NO FERRITE BEAD	FERRITE BEAD
-	M1	BROWN	BLACK1
-	M2	WHITE	BLACK2
-	M3	GREY	BLACK3
-	PE	YELLOW/GREEN	YELLOW/GREEN
-	T1	PINK	PINK
-	T2	BLUE	BLUE





HALL CABLE

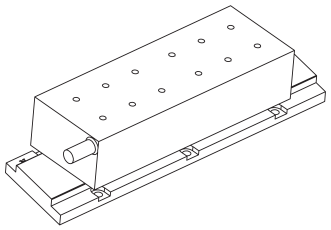
PIN	DESCRIPTION	COLOR
1	HA	GREY
2	HB	YELLOW
3	HC	BLUE
4	5VDC	RED
5	0VDC	BLACK

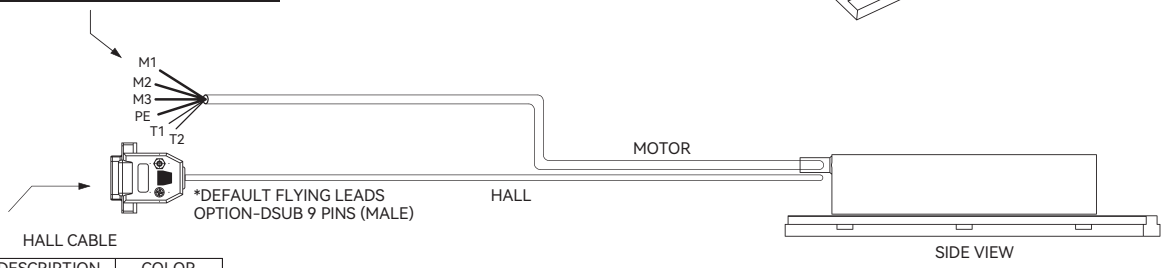


DGC90
—— AQM Series Motor Cable Connection

MOTOR CABLE

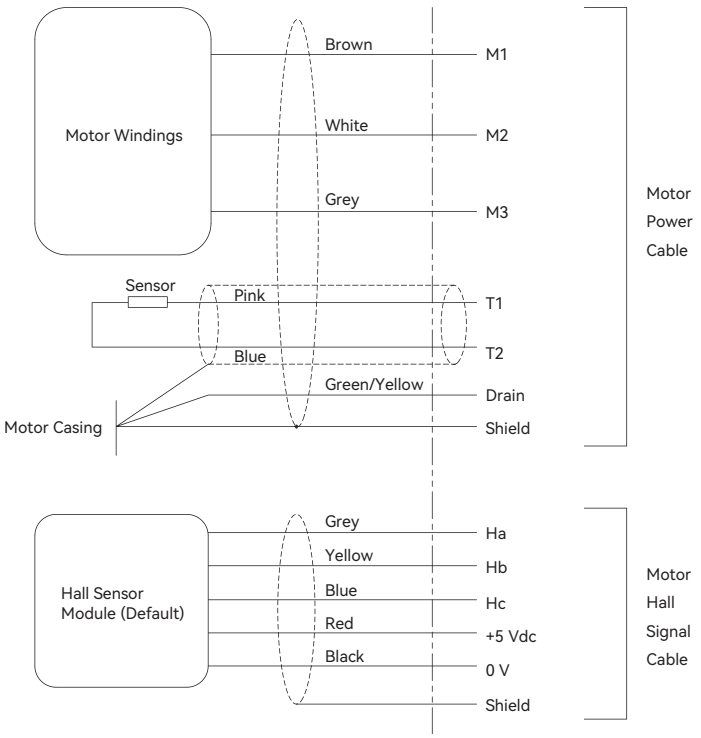
PIN	DESCRIPTION	NO FERRITE BEAD
–	M1	BROWN
–	M2	WHITE
–	M3	GREY
–	PE	YELLOW/GREEN
–	T1	PINK
–	T2	BLUE





HALL CABLE

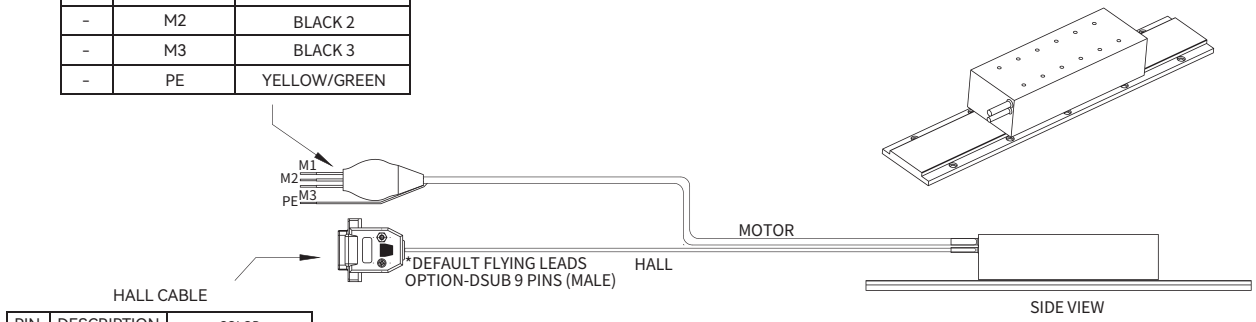
PIN	DESCRIPTION	COLOR
1	HA	GREY
2	HB	YELLOW
3	HC	BLUE
4	5VDC	RED
5	0VDC	BLACK



VRG-III / DGC130B / DGC175B / DGC235
—— AKM Series Motor Cable Connection

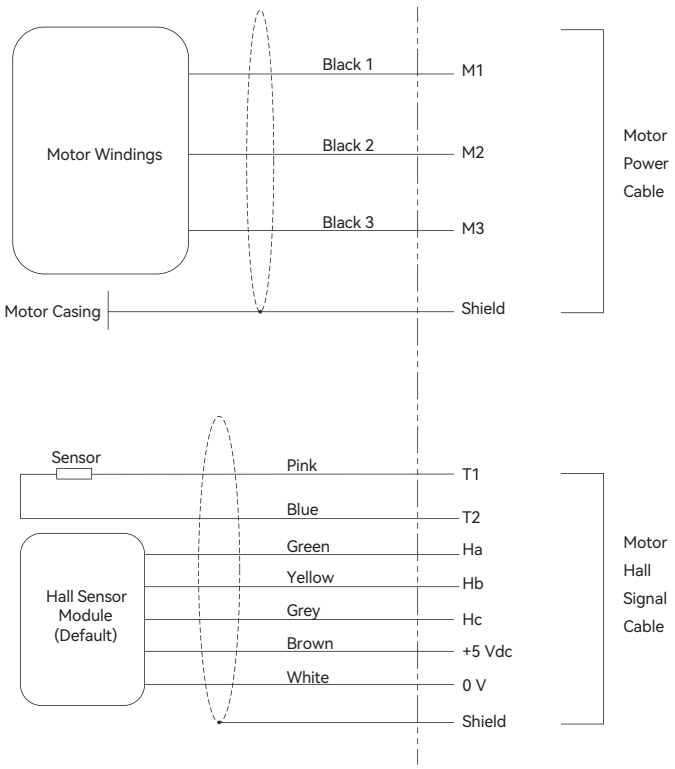
MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	BLACK 1
-	M2	BLACK 2
-	M3	BLACK 3
-	PE	YELLOW/GREEN



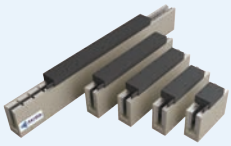
HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREEN
2	HB	YELLOW
3	HC	GREY
4	5VDC	BROWN
5	0VDC	WHITE
8	T1	PINK
9	T2	BLUE

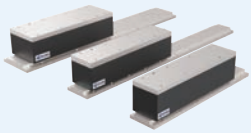


Motor Series

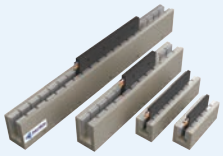
AUM series



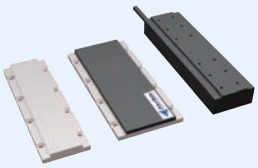
ACM series



AWM series

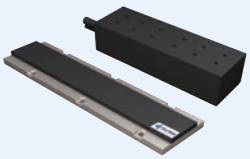


AJM series

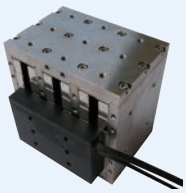


AKM series

AQM series



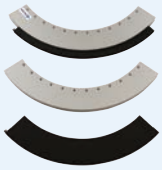
AHM series



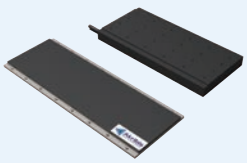
ALM series

ACM-D series

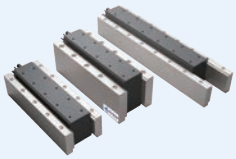
ACR series



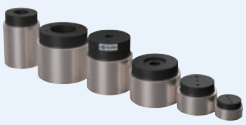
AKH series



AKD-A series



AVM series

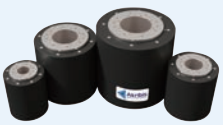


AVA series

ATA series

ADR-A series

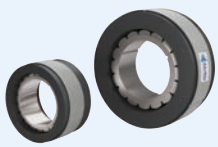
ADR-B series



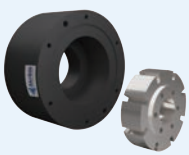
ADR-P series

ADR-F series

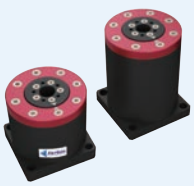
ADR-T series



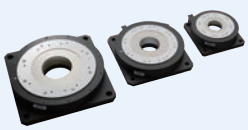
ACD-P series



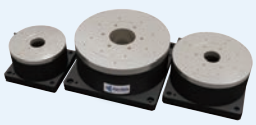
ACD series



ACW series



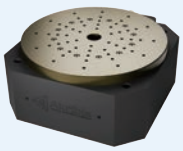
AXD series



AXM series

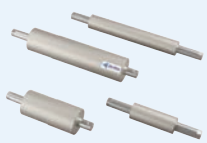
ADR-H series

AAR200-A series



RDM-A series

MSP-A series



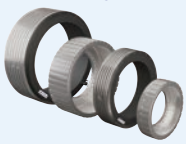
Other Driect Drive Products

Direct Drive Products for CNC

AKM series Water-cooled linear motor

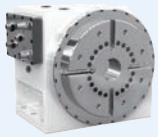
AKH series Water-cooled linear motor

ADR-C series Water-cooled direct drive rotary motor

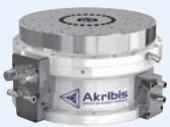


AER-F series Water-cooled direct drive outer rotor rotary motor

ARH series horizontal CNC turntable



ARV series vertical CNC turntable



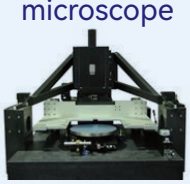
ATRT series Dual-axis CNC turntable

AMH series Dual-axis milling head

Precision Stages for Industries

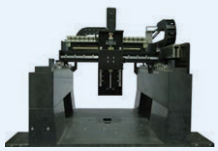
5-axis XYZT for 3D measurement

XYZ stage for wafer microscope

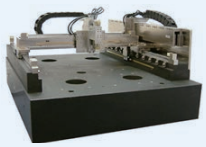


XYZ stage for mobile phone parts assembly

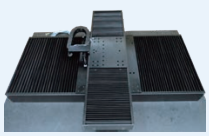
XYZ stage for glue dispensing



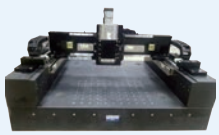
XYZ stage for optical system assembly



XYZ stage for laser application

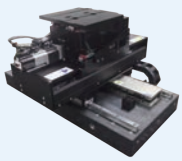


H-drive gantry stage

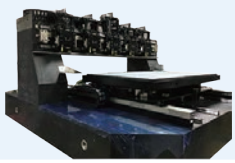


open frame XY stage for wafer inspection

XYZ stage for wafer inspection



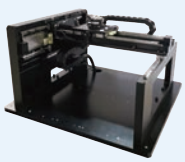
14-axis FPD stage for G6 laser packing



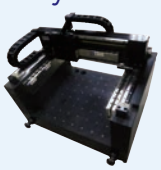
6 DOF mini stage for optical alignment

XYZ stage for fiber optic alignment

XY Stage for glue dispensing

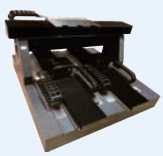


H-drive gantry stage for assembly and testing

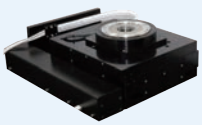


XYZ stage for glass laser cutting

XYZ stage for PCB exposure



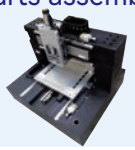
XYT stage for wafer testing



H-drive gantry stage for laser processing

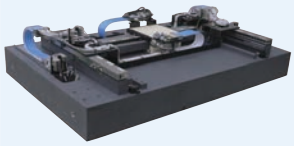
LX1030Z gantry machining center

XYZ stage for laser marking and precision parts assembly



Customized Stages

Semicon
Hybrid Air Bearing Precision Stage

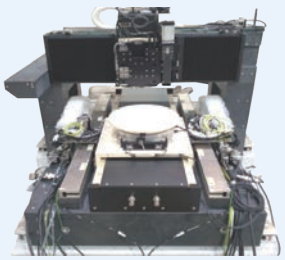


Key features and specifications:

- Flexible H type gantry.
- Hybrid air bearing design.
- Superior 2D flatness within 3μm.
- Can integrate with micro-z for wafer alignment and active isolation system.

Applicable to: Critical dimension inspection, film thickness measurement.

Semicon
Ceramic Air Bearing Stage

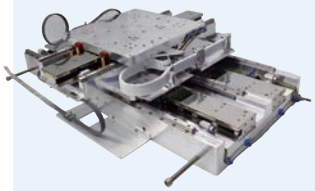


Key features and specifications:

- Air bearing design.
- Alumina ceramic material.
- X and Y axis independent design.
- Flatness and straightness 2 μm.
- Pitch/Yaw 1 arcsec.
- Bi-directional repeatability 0.3 μm.

Applicable to: Laser wafer dicing.

Semicon
Vacuum Precision Stage

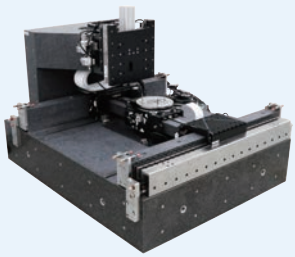


Key features and specifications:

- Suitable for 10^{-5} Pa or lower high vacuum environment.
- Vacuum motor with low heat dissipation.
- Magnetic shield for magnetic field isolation.
- Static jitter ±2 nm.
- Bi-directional repeatability ±0.3 μm.

Applicable to: E-beam inspection, scanning E-beam inspection, scanning electron microscope, e-beam etching.

Semicon
High Precision Air Bearing Stage



Key features and specifications:

- Floating stator, fast settling time.
- Air bearing guide, high mechanical performance.
- 2D flatness less than 6 μm.
- Straightness 3 μm.
- Bi-directional repeatability ±0.4 μm.

Applicable to:
Wafer inspection and metrology.

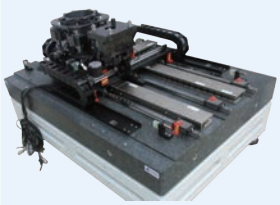
Semicon
High Speed Gantry Stage

Key features and specifications:

- High peak velocity and acceleration. Peak acceleration up to 30 m/s^2, peak velocity up to 3 m/s.
- Force frame design for fast move and settling.
- Thermally decoupled in design for good thermal stability.

Applicable to: High accuracy SMT.

Semicon
Precision Mechanical Stage

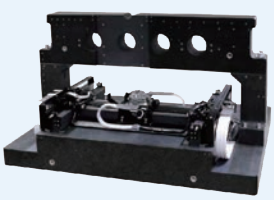


Key features and specifications:

- High precision mechanical bearing design to achieve good static and dynamic performance.
- Overall operation accuracy ±0.75 μm.
- XY+ZFT integrated.
- Operate with high end controller to suppress low frequency vibration for demanding throughput.
- Z axis assembly accuracy within 2 μm.

Applicable to: Wafer prober.

Semicon
H-drive High Precision Dual Air Bearing Stage

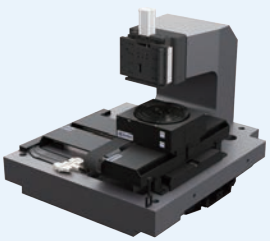


Key features and specifications:

- Full air bearing design.
- Bi-directional repeatability 0.2 μm.
- Straightness and flatness 1.5 μm.
- Static jitter ±10 nm.

Applicable to: Wafer inspection and metrology.

Semicon
Four-axis Precision Stage



Key features and specifications:

- Wafer defect detection equipment used in semiconductor forward process.
- Compatible with 8/12 inch wafers.
- XY repeatability ±0.5 μm, static jitter ±20 nm, velocity ripple 0.5%@300 mm/s.
- Optional material transfer unit module, passive vibration isolator.

Applicable to: Defect detecting (AOI).

Other Driect Drive Products

Customized Stages

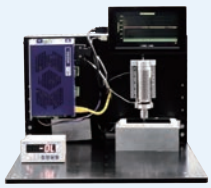
Electronics Manufacturing
Mobile Phone Cover Assembly

Key features and specifications:

- Patent design to replace robot arm.
- Compact design for Z and T to move simultaneously.

Applicable to: Electronics manufacturing, pick and place, press, press, keep pressure.

Electronics Manufacturing
Precision Force Control Testing



Key features and specifications:

- Fully enclosed design to prevent contamination.
- Force control range 1 kg. Force control precision ± 1 g.
- Operates with AGD301 and self-developed algorithm.
- Lift or press optional.

Applicable to: High precision force control, aging.

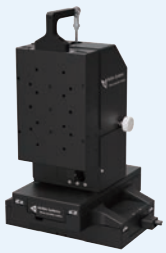
Photovoltaic
Air Bearing Stage

Key features and specifications:

- Full air bearing stage, stroke up to 3 meter.
- Velocity ripple less than 0.5% at 50 mm/s.
- Full stroke bi-directional repeatability ±0.5 μm.

Applicable to: PSC coating and perovskite scribing.

Optical Communication
Three-axis Precision Stage

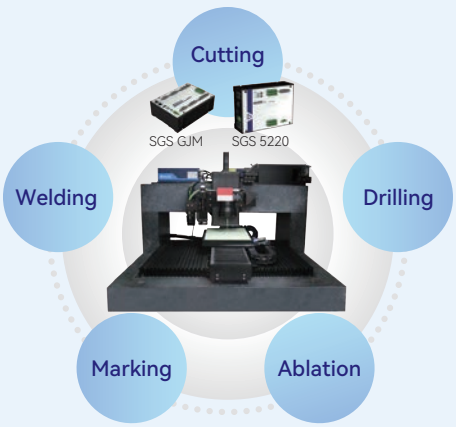


Key features and specifications:

- Cross roller bearing design for high mechanical precision.
- Direct drive technology with magnet spring or air cylinder counter balance.
- Bi-directional repeatability ±0.1 μm.

Applicable to: Fiber alignment, optics assembly and inspection, sensor testing,etc.

Other Customized Solutions



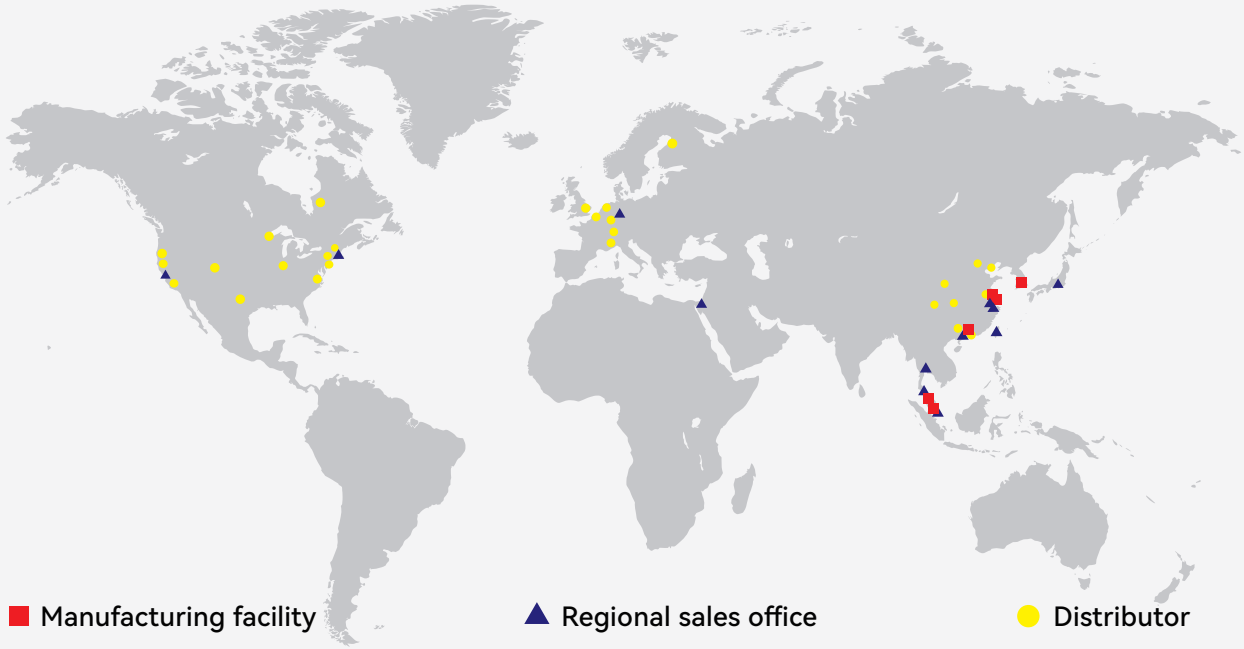
SGS Laser Micro-machining Solution

Key features:

- Synchronized galvo and stage, achieving no stitching error and unlimited field of view processing.
- Precision direct-drive stage customization to meet the needs of various application scenarios.
- Real-time compensation for stage following error by galvo for high-speed and high-precision processing.
- Trajectory optimization algorithms significantly improve processing efficiency.
- Customized GUI software services.
- Used for drilling, welding, cutting, marking, scribing, and slotting in ultrafast laser micro-machining.

Applicable to: Laser micro processing of electronics manufacturing, new energy, precision medical instrument, semiconductor etc.

Akribis Worldwide Offices and Distribution Network



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